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THE BUILDER

A JOURNAL FOR THE ARCHITECT AND CONSTRUCTOR.

WITH WHICH IS INCORPORATED "THE BRITISH ARCHITECT."

XXVIII.—No. 4275. JANUARY 9, 1925.

PAST, PRESENT AND FUTURE

IT was Goldsmith who wrote, "Hope, like the gleaming taper's light, adorns and cheers the way," and in offering our readers the best wishes for the New Year we do so with this thought in our mind. The practice of architecture and the associated arts involves the expenditure of a large amount of capital, which clients do not willingly invest in building when the welfare of the country is in an uncertain state, and though we are still confronted with anxieties which are in part the legacy of the Great War, we believe there are hopeful indications that we are gradually settling down to a healthier state of affairs. Our principal reason for this optimism is our belief that the government of the country will be wisely directed, and, we hope, in no mere party spirit. Knowing from past experience the paramount importance of stable government to the well-being of the State, we can express the hope, in which we are confident our readers will share, that the affairs of the country will not be disturbed by another General Election for some years to come. Surely no party chosen in the circumstances in which the present Government was elected could fail to devote their best ability and energy to the solution, primarily, of the two great questions of housing and unemployment, which are so closely one. Though it may be too much to expect any Government to produce an immediate solution of these and other problems, we can at least hope for sound judgment in their handling, and a policy in which vision will play some part. Other questions, we know, call for wise and sympathetic consideration, but these two are at the root of much legitimate social unrest, and if the Government—which appears to have an exceptional opportunity of promoting the public weal—are able to accelerate housing and reduce unemployment, they will earn our grateful thanks.

The past year was marked by considerable activity in the industry, but the amount of work carried out was affected by the unfortunate strike in the summer, which created a feeling which did a good deal to disturb the friendly relations previously existing between employers and operatives. The settlement of this dispute, while it provided for an increase in wages, did not give the operatives all they hoped for, and it is stated they are contemplating a further effort to improve their conditions. This in itself is a laudable desire, but those who endeavour to take a wide view of the nation's needs and its spending power and the conditions prevailing in the building industry, as contrasted with the conditions in other industries, are apt to think of the fable of the goose and the golden egg. Most of us would like to improve our conditions, but in the long run we are forced to recognise the logic of facts and act accordingly. In any case, with labour difficulties and high costs, the fullest activity in the industry cannot be reached; many building undertakings are held up, and may be eventually abandoned, while even working-class houses cannot be built without State aid. With a great shortage of building trade labour, the operatives are able to obtain high wages, for which, it is stated, they do not give an adequate output, while the regulations of their unions make it impossible to augment the supply of labour from the ranks of the unemployed. We should like to see the Government undertake an inquiry to show how far, if at all, the allegations of "ca' canny" are justified, and to what extent labour from unemployed ranks could be utilised in the building trade if it were not for the opposition of the unions. An industry which directly and indirectly gives employment to such a large part of the adult population of the country cannot indefinitely be kept in bondage by artificial conditions, and we believe the result of an impartial inquiry into these conditions would have a beneficial effect, especially if it were followed by the re-establishment of the Industrial Council for the Building Industry, or a similar body such as a Board of Arbitration, to which, as before, representatives of the architectural profession should be elected. If the Government can elicit the facts in regard to industry and give the country the fullest information, we believe much would be done to create public opinion before which no class interest can, in the long run, prevail.

Houses for the working and middle classes are still our immediate need, and though there has not been sufficient time for the new Housing Act which was introduced and passed by the first Labour Government to function, we know that some 120,000 houses were actually built by local authorities and private enterprise under the previous Acts, a considerable majority of which, we are glad to add, are being erected by private enterprise. The need is still urgent, and it is not surprising that the Government and others are giving serious attention to the production of houses which will dispense as much as possible with bricks and mortar and building labour. Much use has already been made of concrete, and how far we shall go with the proposed steel house time alone can show; but we have no doubt that once we are reconciled to such methods and types of construction—and the Government have done well in this connection in arranging for experimental steel houses to be built in various parts of the country—architects will be found equal to the occasion, and will design well-proportioned steel houses which will be as satisfactory in appearance as are the best of the recently-erected houses, if only they are given the opportunity to do so.

During the past year an increased public interest in architecture has to be recorded, and the loss of some well-known and accomplished architects whose death we deplore, but whose high attainments will, we may hope, be equalled by many of those who come after them. But the great achievement in the architectural profession has been the amalgamation of the Royal Institute of British Architects and the Society of Architects, and probably no step of greater importance to any body of professional men has ever been taken. There can be no question of the wisdom of such a union, by which much overlapping of work for the good of the profession and much public misunderstanding of the status of architects and the bodies representing them are now avoided. With this fusion, under wise direction and undivided counsels, much may be accomplished for the profession—even statutory registration itself, though we do not regard such a measure as a panacea for all the ills of architects, nor do we think it can be achieved, if at all, in a short time, or without great and persistent effort. But the unity which has been secured has already given birth to a spirit of hopefulness and a belief that there is now more driving force in the Institute, and a greater effort than ever made for the good of the profession. We look for a courageous and progressive policy on the part of the Institute, and we may hope that in the year before us not only will it establish its right to control those affairs which directly concern architects, but that it may also take part in the consideration of matters which indirectly, but none the less vitally, concern its members. Such questions as the education of architects, architectural competitions, fees, professional conduct, and others very properly come under the control of the Institute, but its influence must be shown in no halting or uncertain manner on other questions of a more general public interest. The height of public buildings, obsolete building by-laws and regulations, the disfigurement of buildings by flashlight and other advertisements, public improvement schemes, are all matters on which the judgment of architects through their representative Institute should be heard. We do not doubt that the Institute is keenly alive to the importance of its opportunities and responsibilities, and its willingness to co-operate with others in the improvement of the art of architecture, as well as in the industry in which we are all so vitally interested. But we must never forget that each one of us has an individual responsibility and that the sum total of individual effort is the resultant force from which we derive our power for good or evil, and this may well be our first thought for the New Year.

NOTES.

Preservation of St. Paul's Cathedral.

THE issue of a second interim report by the commission of architects and engineers appointed in 1921 to examine the condition of St. Paul's Cathedral and advise upon the best methods of repair reopens the question of the safety of our greatest national monument. And the report itself is not encouraging. Since the report of June 1, 1922, "Various experiments have been made with the object of strengthening the interior rubble filling of these piers [supporting the dome] by injecting cement under pressure into the cavities that exist in the rubble filling. This has presented special difficulties, owing to the character of the filling." Nevertheless, the proposal contained in the report is to continue these experiments at a cost of some £120,000 to £140,000, "leaving it to a later generation to undertake the larger operation [of rebuilding the piers] should it at any time become necessary." The doubt as to the permanent nature of the proposed repairs and the recommendation to put them in hand are hardly compatible either with one another or with the structural necessities of the case. Strengthening the piers by injecting cement under pressure has proved difficult, and, in the opinion of persons familiar with the problem at St. Paul's and with the solidification of dusty rubble in general, the value of the process in the case in hand is extremely problematical. Whether the binding property of the cement will do as much good as the injection under pressure will do harm is at least an open question. The "treatment is to be followed by a gradual replacement of the broken external facing stones as already carried out by the Surveyor of the fabric (Mr. Macartney) on the S.W. pier," and, though this proceeding is calculated to produce some increase of strength, it appears by the reference in the report to rebuilding by a "later generation" that the members of the Commission have their own doubts upon the sufficiency of the measures they themselves propose.

FIG. 2.—SHOWING FRAGMENTS OF AISLE VAULTS. BEFORE REPAIR.
Netley Abbey: Internal North End of Choir. (*See p.* 55.)

The Resignation of an Architect.

IT appears that the question as to whether an architect may resign his functions in connection with a building during its progress, and, if so, under what conditions, can be answered in brief, to the effect that he is quite at liberty to resign, but that he will be subject to the general law of agency. Mr. A. H. M. Brice (barrister-at-law), in the *Society of Architects' Journal*, for August, 1922, has clearly defined the position as follows: Every architect who enters into an undertaking for valuable consideration is ordinarily bound to perform that undertaking. If he declines to proceed without reasonable and sufficient excuse, there would be a claim for breach of contract. The building owner could not compel him to proceed, but could claim damages. A reasonable notice of the resignation would lessen the damages that would arise.

The Removal of Memorials.

WHILST it is conceivable that, under certain circumstances, the removal of a sculptured memorial of some eminent person from its original position might be justified, we think the strong

VIEW FROM THE SOUTH BANK OF THE THAMES.
Adelaide House. SIR JOHN BURNET, A.R.A., & PARTNERS, Architects.

protest which has been made against the removal of the Queen Victoria statue from its original position in the Prince's Chamber, by Lord Crawford and distinguished sculptors, should succeed.

High Level and Low Level Bridges.

We have often wondered how the preservation of an open view along the Embankment Gardens, from Westminster to Waterloo, appealed to those in favour of a high level bridge at Charing Cross, and it was, therefore, with interest that we noted the expression of opinion by an architect that, when he lived in the Temple, he was a low-leveller and desired to keep the uninterrupted stretch of gardens and buildings and sky; whilst, now that he goes home by the Strand, his ideal view dissolves and he sees nothing but high level bridges; he would even keep the overhead roads on the south side, though he is sure the south side is going to have a proper town-planning scheme. Our own desires are all, it is needless to say, for what may prove the finest and best result; but we wonder whether those who are able to give expert consideration to the subject, both from the practical and artistic point of view, have ever made full allowance for the serious effect which overhead roads and viaducts have upon the property and spaces which border their route. The unsightliness of high-level crossings, like that on the south side below Westminster Bridge, and the ugly results about the London Bridge stations, are object lessons. For direct traffic from the south side of the Thames to the north of London we might have flying overhead roadways, which would save time, ease congestion, and help to earn more money; and in the race for ease and cash, much will be possible in these modern days, but the philosopher looks on and asks whether it is worth paying the price for what we get.

Washington Cathedral: View of Apse.
MESSRS. FROHMAN, ROBB & LITTLE, Architects. (*See p.* 44.)

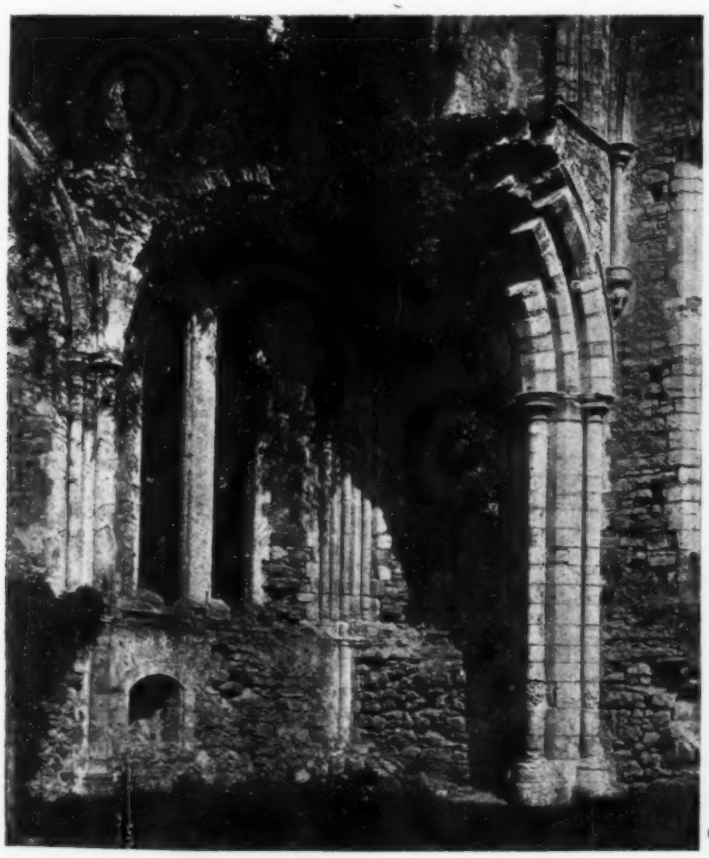


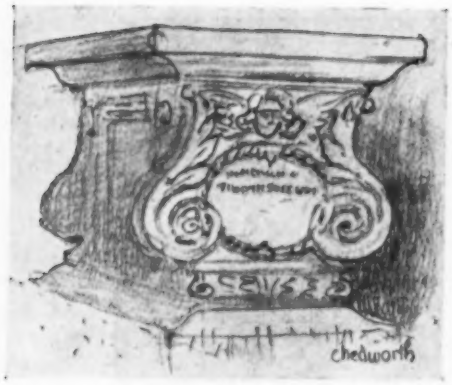
FIG. 5.—SHOWING FRAGMENT OF AISLE VAULT, BEFORE REPAIR.
Netley Abbey: Chancel, North Aisle, East End. (*See p.* 55.)

The Church and Architects.

At meetings recently of the Advisory Boards set up by the ecclesiastical authorities of the Church of England in various dioceses, certain suggestions appear to have been made that architects are dangerous persons, who always want to pull down ancient monuments rather than to preserve them. It is therefore of interest to note that the Chelmsford Advisory Board recognises the value of professional advice and specially recommends that architects should be consulted. The special question at issue is that of the memorial tablets placed in churches that are so often lacking in artistic merit and so frequently are merely shop patterns. The Board states that prospective donors of memorials should consult an architect so that the memorial may be designed to harmonise with the character of the building in which it is proposed to place it, and not be merely a copy of some stereotyped design.

Higher Buildings.

There is now ground for hope that the vexed question of higher buildings will shortly be settled. No one who considers the amenities of London desires to see the multi-story buildings of New York in our already congested streets, but there is something to be said for permitting a slight increase in some situations above the present limitations of height. The London County Council is, we believe, to reconsider this question shortly, and we have grounds for believing that it will be asked to permit the erection of buildings of a height slightly in excess of the present limit.



Tomb at Chedworth.

Graveyard Memorials.

WHY is it that we may examine a gallery full of modern pictures with feelings of little or no real interest, and yet spend much pleasant time in the appreciation of art in the old grave memorials in an old churchyard? Is it because one is a living art and the other a dead one? The design and craftsmanship of thousands of our old gravestones were the result of an intuitive art which was so widespread and common that the few successes we achieve in this kind of work nowadays are absolutely paltry in comparison. The average trade samples of design in the present day afford us little or no pleasure either in design or in execution. It is well that the Institute of Industrial Art has given attention to the subject and in consequence issued a pamphlet intended to guide the public demand for something better. That there is something to be done to help to better things is evident from one of the regulations in force at a large London cemetery, which says, "all first-class graves must have, except in stated positions, a marble or granite monument." But there are many regulations which are still in force for the government of a great and enlightened nation which are as absurd as this. It seems incredible, moreover, that in some cases the use of bronze or copper for cramps and bolts and slate for dowels is excluded.

Our Modern Cemeteries.

OUR readers will be interested in the pamphlet before us, entitled "The Art of Graveyard Monuments," issued from the British Institute of Industrial Art, 18, Grosvenor-gardens, price 6d. It deals with the probable causes of the appalling character of our modern cemeteries, and amongst these we think that most difficult to alter is the apathy of the general public in the matter. This apathy is largely founded on ignorance, for surely we should not wish to memorialise our dead ones by vulgar, stupid, and meaningless monuments, which form the bulk of our modern productions, in comparison with which a plain, well-outlined stone which we once saw in a churchyard stands out in our memory as the very antithesis of modern graveyard design; it carried simply the words, "To dear Jane." The heroism of Nurse Cavell, great as it was, may lose in the dignity of its memorial by overstatement, whilst the very simplicity of the memorial to "dear Jane" finds a ready echo in our hearts.

Simple Memorials.

REMEMBERING the change and decay for ever going on on the earth and the transitory nature of our lives, our loves and our ambitions, we might be inclined to think that our simple little memorials of those we have loved are of small account. But they are not, and surely the feelings which prompt them are not to be discouraged and should find an expression which may have something of beauty and dignity, however simple it may be. Never probably in the history of the world have there been erected so many memorials to the dead as during the last ten years. Millions have found no more expression but a simple wooden cross, but these simple wooden crosses typify untold volumes of love and command a universal regard. If any form of craftsmanship and design is worthy of the very best we can bestow, it is surely that which seeks to embalm the memories of those we have loved and lost.

Concrete Statuary: Figure of "Britannia."
MR. GILBERT BAYES, Sculptor.

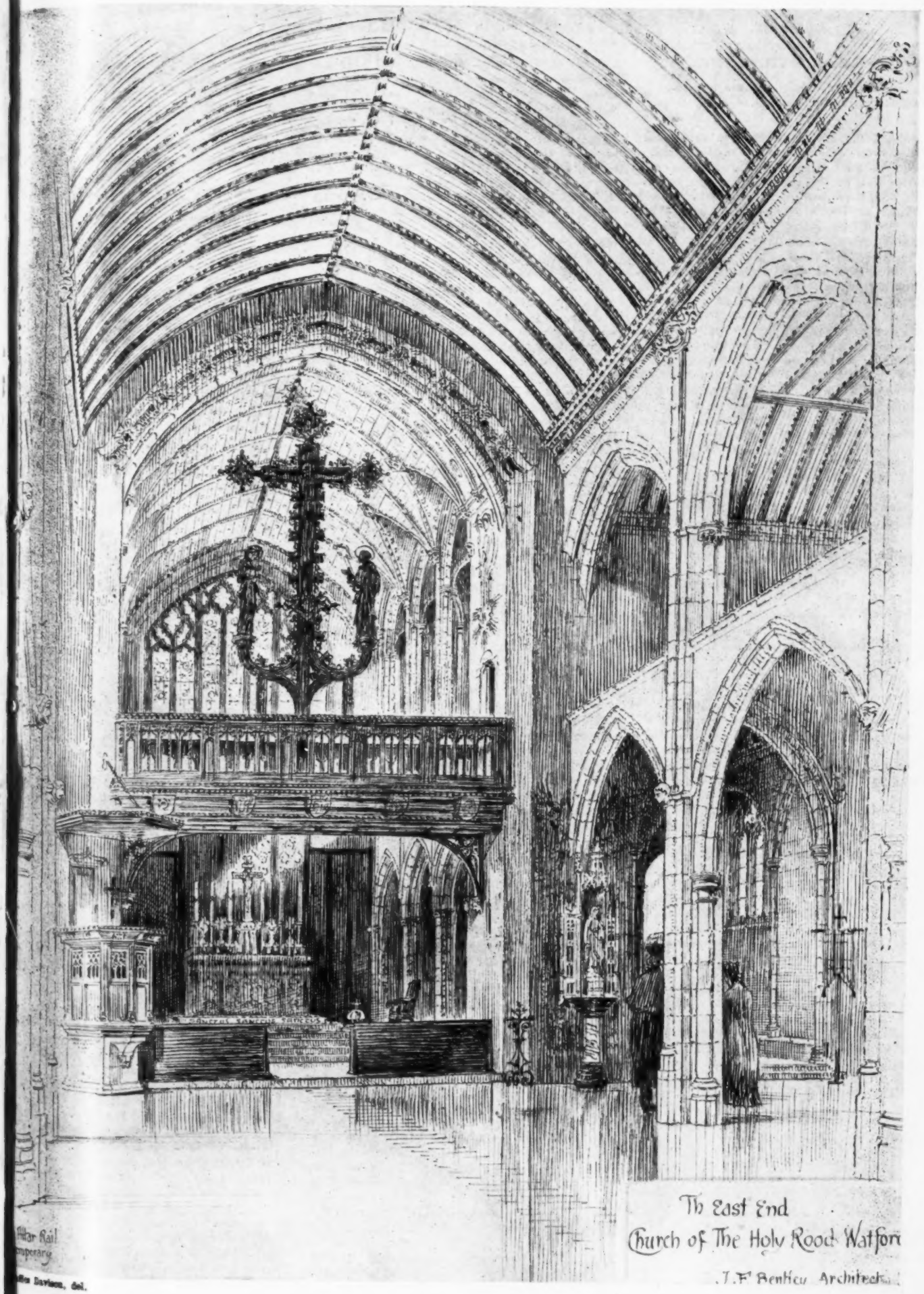
An Old Tombstone.

Building By-laws.

THE irksomeness of some of our anomalous building by-laws and regulations, many of which were framed many years ago, has again been discussed, but there is every probability that they will be revised in the near future as a result of the report the Architect of the London County Council is now preparing for presentation to the Council, and that it will soon be possible to take more advantage of modern knowledge in the science of building and of improved and new materials.

Craftsmanship.

IT is a noticeable feature of the age to be marked by violent contrasts—movements related in their objects, and yet directing themselves in such opposed directions. So we see the standardisation of building, the reducing of art to the mechanics of mass production on one side, and the Royal Institute of British Architects inaugurating a movement to encourage fine craftsmanship by the exhibition of works of good artists on the other. At a time when mechanical methods are more and more imposing themselves upon us and the individual seems to count for less, it is very important that any emphasis which can serve the interests of vital craftsmanship should be kept prominently before us. At the same time the difficulties of the task will only appear when taken in hand, and unless the Institute takes up a firm position, founded on the true principles of craftsmanship, the opportunity may be made use of merely to further what needs no encouragement. The Institute is no doubt aware of this danger, and will hold the balance between the assumptions of personal craftsmanship and the actual reality. There have been movements in the past to promote craftsmanship and craft ideals which in practice have been found wanting as not representing the ideals preached, and it will be a difficult path for the Institute to steer where there are so many called and so few chosen.



Church of the Holy Rood, Watford : East End.

The late J. F. BENTLEY, Architect. (*See. p.* 64.)

PHILIP WEBB AND HIS WORK.—I

By W. R. LETHABY.

OXFORD BEFORE THE RAILWAY.

"A vision of grey-roofed houses and a long winding street, and the sound of many bells."
William Morris.

THE subject of this little record studied and worked as an architect from 1849 to 1900, when he retired. His active life thus covered the latter half of the nineteenth century—the mature Victorian epoch. He was little known, but that, as the spinster said, was "by choice"; few ever heard of him just because he was so great a man.

It is a recent theory that life histories should be detached and judicious, critically apportioning praise and blame in due measure, telling of failings and fallings as well as of gifts and givings. Truly it is an admirable theory, but how is one to know what to praise and what to blame? No two observers ever see the same phenomena from the same point of view. Sometimes I think this modern theory may lead in practice to the sprinkling of a number of unfairnesses over a story just to make it *seem* "fair." It must be said at once that the writer of these notes is drawn by most uncritical admiration and reverence to make this little memorial. I write not because I can judge Philip Webb, but rather that in his life I find a means of judging my own.

Webb was one of the typical (and I believe great) Victorians; he did, or attempted to do, for building what Browning attempted for poetry: to revitalise it by returning to contact with reality. My subject as I see it is the architect as hero.

Webb was a member of the later pre-Raphaelite group (the post-Ruskinite group it might be called)—its architectural member; one of the founders of the firm of Morris & Co., and the intimate friend of William Morris. Possibly somebody reading these notes may be inclined to say that there is too much about Morris, but the two men worked together so closely and influenced one another so much that they can hardly be separated.

From a letter written to Webb by his sister Caroline in 1906, describing the meeting with a second cousin, "the brother of Captain Matthew Webb who swam the Channel," some facts regarding the family appear. She says: "He is much interested in the works of his great-grandfather, our grandfather Thomas Webb (Webb and Hardman)." The letter also mentions "a family pedigree dating from 1746 to the present time, six generations."

The Thomas Webb just mentioned was an able medallist who was born in Birmingham and worked there during the first generation of the nineteenth century. He did some amazingly accurate portraits of Nelson, Wellington, Pitt (1808), etc. A medal of Sir R. Abercromby is described in Forrer's *Dictionary of Medallists* as "an extraordinary specimen of medallic engraving of nearly a front view: its drawing, its likeness, its fleshiness and neatness place Webb amongst the very first of modern medallists in the class of busts." Philip Webb had a gold copy of the Pitt medal executed for the Pitt Club of Nottingham which is now in the Fitzwilliam Museum; he also had a wax portrait medallion modelled by his grandfather. The accuracy and even the "neatness" of Thomas Webb seem to have been inherited by his grandson.

In 1831 Philip Webb was born, January 12, at No. 1, Beaumont-street, Oxford. It was a time of vast changes and great disturbance, the year before the great Reform Bill. "The workmen in the North were drilling and arming to fight the Lords. In the South the ricks were blazing night after night. Unemployment and starvation urged desperate deeds." It was the time of rapid expansion: the population increased from about nine millions in 1801 to eighteen in 1851. In 1830 the first railway was opened. Philip (christened Phillippe Speakman, after the French King and his own mother) was "one of a family of eleven, all obstinate." His father, Charles Webb, "a country saw-bones," seems to have been a strong and intelligent man with "a certain turn for the pencil and a knowledge of animal life." When Philip was about three years old the family moved into another house in St. Giles, No. 15, on the St. John's side and farther north. This house was formerly the Oxford residence of the Dukes of Marlborough. Later E. A. Freeman lived in it, and here died. It had two gardens and all the delightful courts and out-buildings of a county-town doctor's premises. The practice required much riding, so that the son grew into a close understanding of horses and their ways, and early became a good rider.

Charles Webb drew quite well, and also cut out the forms of animals with scissors in paper. (This art, I remember, was still practised a generation later, and the magic of it turned my own mind to drawing.) "He and his son seem to have shared an instinctive knowledge of the forms and habits of animals," so says Mr. George Jack, his assistant for many years; and I remember Webb himself telling me: "To draw animals you must sympathise with them; you must know what it feels like to be an animal." When quite young Philip had a pony, and later he remembered how, when riding in Port Meadow, he had been chased by horses. His sister, who survived him (living until 1922), told me in 1917 that she could remember how one evening, when they were all in the garden, the bells of Oxford tolled, and her father said: "King William must be dead." She also recollected the Otmoor riots (September 6, 1830), and how men brought as prisoners to the town were released by the crowd.* One of Webb's brothers, Henry, followed the father and became a doctor, "a Bartholomew's man"; another entered the church.

Once, when talking to Webb (March 21, 1899), something brought up a reference to country fairs, and this reminded him how they used to watch the September Fair—the old St. Giles's Fair—from their house not far from St. Giles's Church. "I used to try—unsuccessfully mostly—not to go to sleep before the clock struck twelve, so as to hear the vans come into the town. This was not allowed till midnight. In the morning it was a great joy hearing the hammering down of tent pegs, and, on looking out of the window, to see the painted caravans. Soon the hobby-horse came, which capered in the front of the show and down the inclined gangway. Then the pretty lady, dressed in pink legs and flounces, danced. Inside, Shakespearean plays were given, such as the first part of 'Henry the Fourth,' but not more than three and a half minutes long." Hobby-horses and Shakespeare were both gone from fairs in my time, but these earlier shows clearly had "cultural" elements before they were fully commercialised.

"It was something to have been taught to walk in St. John's garden. There was a tree there on a grass mound which seemed quite a mountain; my mother used to place me there and get me to run down the slope to her." There could hardly be a better beginning of memories than this. In early days, when he himself was dressed in naked legs, they stayed at Newington by the river—"the smell of meadow-sweet always brings back that time." Speaking of this, he went off to remark that "memories cannot be arranged in the mind like books on a shelf, but rather they seem to be stimulated by something in the nature of vibrations." He recalled also sitting in a church, the door open, and dazzling sunl outside—Sunday afternoon sunlight—thinking: "How delightful it would be if right things were wrong and the wrong right."

In the "'thirties" of last century, Ox was a work of natural human art from end to end. It had not been smirched over by new commercial architecture and was prac ally unspotted by the world. A row of g old elms grew in St. Giles's. Webb wat the building of the Taylorian Galleries, the railway was not brought into the town he was sixteen. Ruskin, who went to Ox in 1837, says: "The cathedral was an epi of English history. Every stone, every p of glass, every panel of woodwork was and of its time—not an accursed sham of architect's job. . . . The Norman vaults a were true English Norman. The roof true Tudor. The west window, with clumsy painting, the best men could do of day; and the woodwork of the stalls re sented still the last art of living England the form of honest and comfortable carpentr Morris, who went up in 1853, says: "Ox in those days still kept a great deal of earlier loveliness: and the memory of its g streets as they then were has been an abi influence and pleasure in my life—and w be greater still if I could only forget what are now—a matter of far more importa than the so-called learning of the place co have been to me. . . . The guardians of beauty and romance, so fertile of educat though professedly engaged in the 'big education' (as the futile system of comp mises which they follow is nick-named), l ignored it utterly, have made its preserva give way to the pressure of commercial gencies and are determined apparently destroy it altogether There is another plea for the world gone down the wind; here, ag the beauty and romance have been useles causelessly, most foolishly thrown away. It has been sold at a cheap price inde muddled away by the greed and incompete of fools who do not know what life and plea mean, who will neither take themselves let others have them. That is why the de of that beauty wounds us so."

The depth of Webb's devotion to Ox may be suggested by two or three extra from his letters. Writing of the "resto tion" of St. Mary's spire, he says: "I w too cowardly to face the wrecking of this g historical monument. Its singular beauty part of my life's delight, so that the carel ness displayed was too painful for me to fa . . . I think it was in 1852 or 1853, after my apprenticeship ended, that, happ ing to be in Oxford, I got permission to mo the scaffolding to the top of the spire, at time alterations and repairs were being d under the architect Buckler. Young as I I realised the mischief going on in raising thus changing the outline of the central sp by adding some 6 or 7 ft. At this time pinnacles were greatly tampered with, wh have now been re-transformed. Some m should be made to get the original statues in a safe place so that they may be watched the public; otherwise they will surely be injured or destroyed where they now st hidden away." "I was born and bred Oxford, and had no other teacher in art th the impressive objects of the old buildin there, the effect of which on my natural h has never left me." "All my life, si leaving the then more beautiful place than it is, has been coloured and even trained its fashioning." November 9, 1911: "T you should have been called to Oxford seve times of late in duty bound, touched me. that place is mine and I am of it, with its cranks and corners and passages, e still in my mind; and I was not with As you went to St. Thomas's, its neighb

* "During St. Giles's Fair, 1830, forty-four persons apprehended for riotous demonstrations against the enclosures at Otmoor were carted off to Oxford gaol, escorted by Yeomanry. They managed to get their prisoners as far as the turning down Beaumont Street, but there they were overpowered and the prisoners escaped." ("The Village Labourer," 1911.)

the Castle and its monster beauty of a keep, also the mill and the threads of waters thereby, must have held you astounded."

Such were the impressions made by the outward aspect of Oxford.

The thought of the time was greatly engaged with the ecclesiastical movement which, for so long afterwards, seems to have tired the University. In 1848 Newman removed into the Roman Church. Webb had heard him preach, and he cannot have been untouched by the controversies of the time. The Oxford interpretation of religion was not for him, but Oxford City called him.

Webb remembered a great sundial at All Souls, worked out and set up by Christopher Wren, and destroyed in the names of art and restoration by some eminent "restoring" architect. "It was so scientifically accurate that the people set their clocks by it." It may not be doubted that of all who loved Oxford before the deluge, Webb did so the most consciously and profoundly. He saw the things that belonged to her peace. This Oxford of Webb's day is well recorded, so far as things may be recorded on paper, in a collection of drawings by Buckler in the MS. Room of the British Museum. Even as I remember it, more than forty years agone, it was peaceful and lovely, not only in insulated College gardens but in the streets. Webb remembered Baxter of the Botanic Gardens, whose book was one of his Bibles, as also was Bewick's "Birds," which he knew from earliest days. After his telling me of Oxford Fair and the grass mound in the College garden, we talked of what life is becoming in big cities with the avenues of sensation closed to ideas of beauty. No sunny, green grass mounds and grey Gothic buildings, no sounds of bells and birds. All old buildings, he said, must necessarily disappear in our exhausting commercial age. "In Oxford there is the densest apathy regarding all matters of art. It would be quite useless to try to talk to X——, one might as well speak to an Ogham stone."

When eight years old, Webb was taken and left at an old foundation school at Aynhoe, in Northamptonshire, but only just beyond the Oxfordshire boundary and about a dozen miles from his home. "I still remember the inky smell of the desks and wanting to weep, but the windows were open and the cries of the swifts flying past comforted me a little." These school days were not happy, and he always spoke with dislike of "boy farms." It had been said, however, that "the condition of our public or higher schools was worse between 1750 and 1840 than at any time since King Alfred. The grammar schools were largely derelict and often scandalous." Outwardly the school at Aynhoe, as illustrated in an old book on the grammar schools, was pleasant to look at.

Returning to Oxford in the holidays, the city was all the more consciously *seen* and loved. "I explored all the courts and lanes, especially in the vacations, when it was all mine."

In 1848 Charles Webb died, at the age of fifty-three. At about the same time (early in 1849, I believe) young Philip Webb was apprenticed to Mr. John Billing, architect, of London-street, Reading, then a town of considerable beauty, having three or four old churches, the abbey ruins, and many substantial Georgian houses. London-street runs up the hill to what would have been quickly reached unsoiled country. In 1900, being questioned about a remarkable old house, then threatened, now successfully destroyed, he said: "I have some dim recollection of Southcote House, but though I was some four years or so at Reading, I never got into it, although I looked round it; but that was some fifty years agone." In the 1922 Report of the Society for the Protection of Ancient Buildings, which Morris and Webb founded, is this: "It is sad indeed to report that Southcote Manor has been pulled down and is now no more."

On May 7, 1852, Mr. Billing wrote Webb a testimonial, and this probably marks the date of his preparing to leave Reading. If it sounds like Dickens, it is because Dickens wrote the language of the time. "This is to certify that Mr. Phillippe S. Webb completed the term of his articles as an architectural pupil in my office entirely to my satisfaction—during which time his general studies were pursued with assiduity and perseverance, and much proficiency has been obtained. In the best class of drawing and designing Mr. Webb has been very successful, particularly in the several Gothic styles. I may add that his character and manners are unexceptional, and that my retaining him as a salaried assistant, subsequent to the expiration of his term as a pupil, is the best proof of my sense of his recommendations; and it will always afford me much pleasure to be instrumental in advancing his interest and welfare.—JNO. BILLING, Architect, 38, Parliament-street, Westminster, and Reading."

Three sketch-books and two MS. volumes, in which specifications and other documents were copied, represent this period. The first sketch (at St. Mary's, Reading) is dated May 6, 1850; and the last, March, 1852. Webb always spoke well of the competence and honour of Mr. Billing, and in the miscellaneous work of a small town and its surrounding country district an architect's apprentice had to come at once into contact with the hard facts of building—it was not all paper and prizes.

At Reading, Mr. Billing had an assistant who was a member of a very particularly peculiar sect, "Hebrew-Christian or something of the sort." He was called Hutchinson, a fine man who followed the old fashion of dress, wearing nankeen breeches and a green coat, while his hair was uncut and gathered at the back. Moreover, "he held singular ideas and would not take more money than he thought he was worth." Webb remembered that he had propounded a general idea on design, that "composition implies horizontal, vertical and diagonal." So far as he held any abstract theories on design, this notion was adopted by Webb and elaborated into quite a doctrine of the distributed middle term. "Horizontal, vertical and diagonal, black and white *and grey*—principally grey—look at Bewick." Hutchinson went to Canada, and returning, worked in Madame Tussaud's Chamber of Horrors, where Webb could trace his hand in the arrangements.

On leaving Reading, Webb for a short time entered an architect's office in Wolverhampton, and hated it. The change out of Oxford and into the modern world seems to have been a staggering experience. Fifty years later he wrote, in reference to memories of this or some similar industrial centre, . . . "that young rich man sitting down to probably a longish life with all that God-forsaken prosperity drawn from terrible iniquity! . . . My retirement from seeing such places has made me bitterly angry with having my attention drawn to them again. 'Those rows of infernal dog holes,' do I not know them? . . . Walker, who went for his holiday to Venice and other places, tells me it is evident that Italy is on the highway to commercial prosperity, and all that *we* think of in Italy with high regard will be thrown into the Devil's melting-pot of greed. England, of course, is past praying for. . . . This is a blue-black tempered letter, and I beg your pardon for it; but there is always a well of sadness which can be disturbed with such things."

Again, in another letter of about the same time (1901), he said: "The chief of the evil lies with the fatal time we live in, the last century having had a hundred-devil power to corrupt; and this century fully declares itself to be its devil-kin. The fateful stream of our times is running—unconsciously, doubtless—against all that in earlier times made for healthy force, fitness, breadth, and grace of physical beauty. If one but thinks of the factory system which practically came in with last century and was so mistakenly looked on as a godsend towards civilisation, and then of the result of that 'hugger-mugger' breeding, there can be no doubt from this single item alone where the chief evil came from. By the herding of labouring men like herrings in a barrel it had been found out that a class of rich people could be produced whose greed could grasp more than 'the dreams of avarice' had forecast. Well, is there any sign in this new-born century that the greed-god is about to be knocked off its pedestal? In olden time this avarice led to searching for hidden treasure: while now it is possible for multitudinous individuals to find the hard cash of corruption under their own door-sills. I am as sure of this as of any other thing in humanity, that the contempt for the splendour and wonderfulness of nature, and for the unobserved preciousness of the handiworks of earlier times has resulted from the aforesaid deadly ill-breeding."

All Webb's future life was shaped by thought of this and that—of old and new—of Oxford and Wolverhampton.

MEETINGS

FRIDAY, *January* 9.

London Society.—Mr. A. C. Bossom on "Traffic Problem of London." At 18, John-street, W.C.2. 5 p.m.

MONDAY, *January* 12.

Architectural Association.—Sir Owen Williams on "Engineering Work at Wembley." 7 p.m.

Surveyors' Institution.—Mr. L. E. Tanner on "Building of the Abbey Church of Westminster." 12, Gt. George-street, S.W. 1. 8 p.m.

WEDNESDAY, *January* 14.

Edinburgh Architectural Association.—Mr. Hope Bagenal on "Influence of Buildings upon Schools of Music and Declamation."

FIG. 1. **Netley Abbey: Guest House from S.W. Showing excessive growth of foliage.** (*See page* 55).

THE ART OF SYMBOLISM IN GOTHIC ARCHITECTURE

THE BOSSES OF WASHINGTON CATHEDRAL

By OLIVER HOYEM.

MODERN revival of the art of symbolic interpretation is apparent in the work of sculptors at the National Cathedral now in course of erection in Washington and in the plans for a more comprehensive scheme of Christian symbolism than exists in any European cathedral. The finished product will be the work of many hands and minds. Clergy, architects, builders, modellers and sculptors will contribute their ideas and technique. It will be difficult to segregate individual glory, but that is not essential, for in the cathedral tradition the aim is always to build to the glory of God.

As an initiative force in art, religion was stronger in the past than now. The time has passed when all education, all artistic interpretation, centred around the cathedral with which they began. Americans are not, perhaps, willing to consider seriously the influence upon art of cathedrals because there have been no outstanding cathedrals in the United States. The centre of artistic appreciation in the United States probably will be the home. Yet as an agency for expressing in lasting and monumental form the nation's religious faith, the cathedral has no substitute, and to do this in the most artistic manner possible is the aim of Washington Cathedral. The philosopher projects his religious ideals in contemplation and translates them in word symbols. The artist communicates his ideas by pictorial symbols in sculpture, painting, and architecture. In cathedral figure sculpture the tradition of centuries of religious experience has developed an art somewhat unique in its modes of expression. Physical beauty, the ideal of the Greeks, is not the motif of Gothic religious art. The spiritual message is of primary importance; spiritual grace and beauty the ideal.

To understand what part symbolism plays in modern religious expression, one must go to the Old Testament. The symbolism of the Jews was one of the most striking features of their religion. A mystical significance was given even to the stones in the breastplates. The Flood, the Ark, the Manna, and the Stricken Rock became symbols. The principal doctrines of Christianity set forth by Jewish leaders became a mine of symbolism which the Christian Fathers adapted. The New Testament is richer in symbolic values, ending in the Revelations in one continued symbolic poem.

Architecture also has its figurative adaptations. The foundation is the Rock of Ages; lime is fervent charity; water is an emblem of the Spirit; the four walls are the Evangelists of the four cardinal virtues; the towers are the preachers; the glass windows are the Holy Scriptures; the lattice work represents the prophets; the door of the church is Christ; the piers are bishops and doctors. Similar development of symbolism is found in every religion. The possibilities of symbolic representation in stone is infinite. Its study is essential to the background of the artist who would work for cathedrals and churches.

Gothic lavishes exquisite sculptural detail in places where the eye must be raised to look for it. The general effect of the design is not lost by ornate and superficial adornment. Its subtleties are a decided contrast to much of our modern architecture in which every element of merit is made as conspicuous as a false mantelpiece. But, of course, a cathedral is designed as a place in which to linger, to observe, and to attune oneself to the infinite. The longer one lingers the greater the delight in fresh details. A finished cathedral teaches by its art that the beauty of God cannot be comprehended in a glance, and the vaulting bosses are a vital part of this lesson.

Sculptured ceilings 500 ft. long east and west, and 215 ft. across at the transepts will greet the visitor to Washington Cathedral five years hence. One thousand vaulting bosses will tell the story of Christianity. Even the heroic figures on seven-ton stones will not reveal all their detail when viewed from the main floor of the nave 93 ft. below. To tell a message at that distance there must at times be exaggerations of face and figure. A saint may drape himself around a boss in a miraculous manner in order that the person looking from far below may see all of him in one glance. Even such liberties toward saints may be excused in the cause of art.

The Nicene Creed will be the primary theme for the principal bosses in the nave vaulting. Each boss will represent an individual thought, ending in the apse in the east with a symbol of the Gates of Heaven to represent "the life of the world to come." Subsidiary bosses will be ornamented with the emblem of the Apostles, the symbols of the fathers of the early Church, the nine orders of angels from seraphim and cherubim to archangels, and other groups of symbols. Volumes have been written on Christian symbolism, but here volumes will be carved in stone. Carved bosses have been a part of churches in the United States heretofore, but they have been purely decorative, the themes consisting mainly of plant forms based upon fourteenth and fifteenth-century examples. This will be the first time in American church architecture that a scheme of symbolism utilising human figures has been used in vaulting bosses. The plan accepted by the Chapter of Washington Cathedral represents much research work by the cathedral clergy, by Messrs. Frohman, Robb and Little, the architects, and by Messrs. Cram and Ferguson, the consulting architects.

Last summer a group of sculptors and carvers, under Lualdi, Incorporated, of Cambridge, transformed to the limestone vaults of the completed choir aisles the first of the designs for the bosses. Now for the first time can be seen the sculptured stones. Drawing and plaster models have been until now the sole means of illustrating the cathedral scheme. The finished product is always more convincing than the model. Among the symbolic figures of the choir aisles are the Sacraments of the Church and the Seven Gifts of the Holy Spirit. Symbolising the sacraments there is in the first bay of the north aisle a central boss showing the chalice and paten of the Holy Communion surrounded by other bosses of the sacred monograms, the Sheaf of Wheat and the Cluster of Grapes. For the Sacrament of Order there is in the third bay of the north aisle a central boss depicting the Descent of the Spirit at Pentecost, and supporting the representation of Order are six other bosses of Aaron's Rod, Phineas with the Incense, Samuel warning Eli, the Mitre and Crozier, and the open Bible.

The text grouping of the choir aisle bosses comprises the seven gifts of the Holy Spirit, illustrated by saints who symbolise the virtues. In the second bay of the north aisle penance is the central theme, symbolised by the delivery of the keys to Peter by Our Lord, and around it are bosses depicting Pride, Envy, Anger, Covetousness, Gluttony, Lust, and Sloth. Pride is caught in the act of falling. A poorly dressed youth looks longingly upon the fur coat of a modern Babbitt. Anger flails the Cathedral vaulting with clenched fists. A glutton forgets his book of etiquette and gnaws a hambone, and one arm affectionately encircles a bottle. Fires of passion consume a man and woman entwined with the serpent of Lust. Sloth is represented by a gardener, asleep with the weeds of poison ivy growing rampant around him. These figures are dressed in modern clothes.

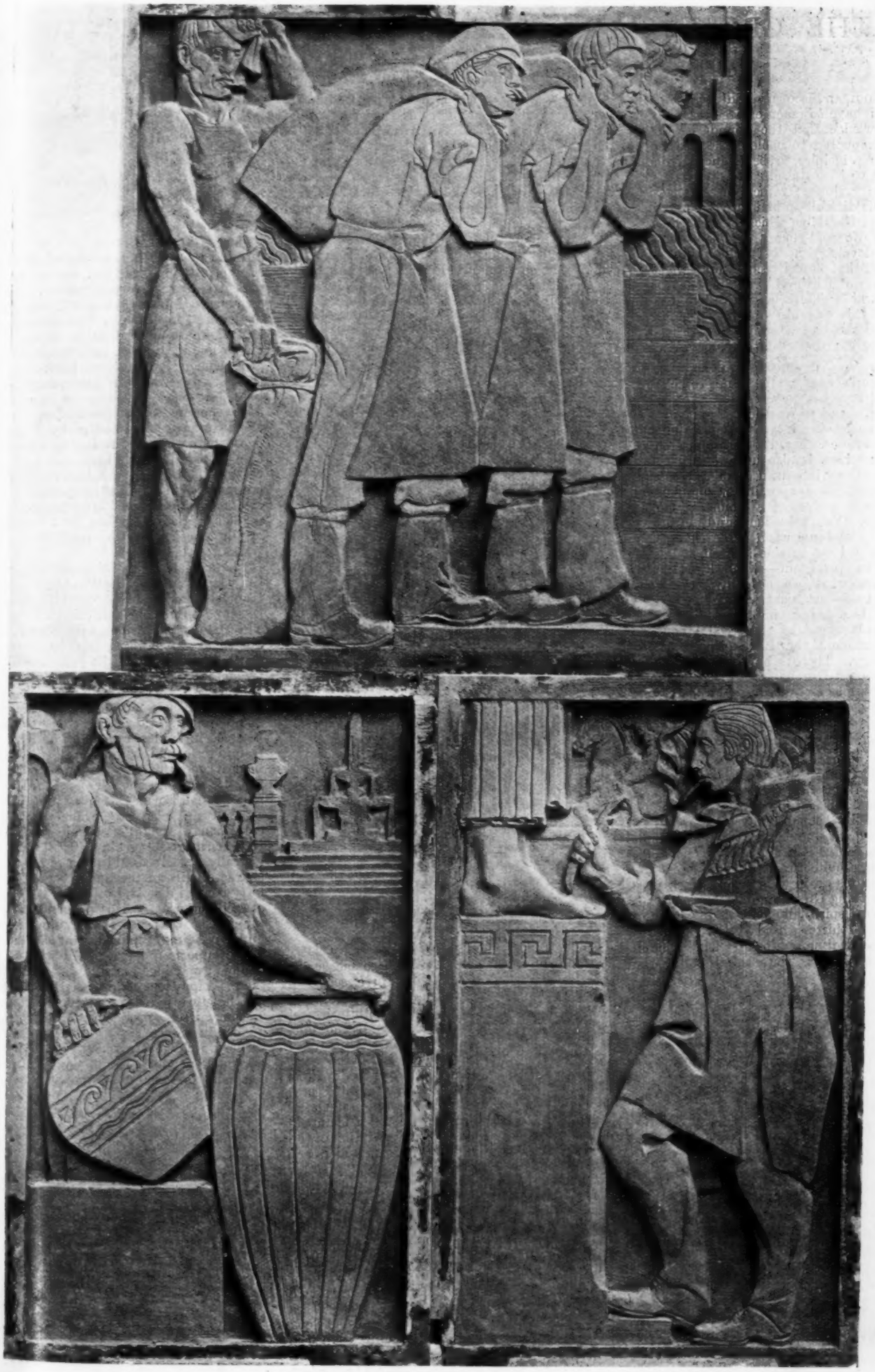
Four of the seven gifts of the Holy Spirit—Strength, Knowledge, Godliness and Holy Fear—are recorded in the south choir aisle. Wisdom, Understanding, and Counsel will go into the bays included in the next construction. Strength in a soldier, and St. George, St. Stephen, St. Alban, St. Pancras, St. Agnes, and Bishop Ken help to symbolise it. St. Sebastian symbolises Fortitude. The Venerable Bede looking up from a book of prayer on a prayer desk symbolises Knowledge and Godliness. The Cross is faith, the anchor is hope, the heart is love. Holy Fear, the theme of the first bay in the south aisle, is symbolised by the six-winged seraph of Ezekiel. One boss shows Moses taking off his shoes in front of the burning bush. Another pictures the woman who wiped Christ's feet with the hair of her head. A third reveals Isaiah and the Angel with the burning coal. Mary of Bethany with the alabaster box and Mary Magdalene at the Resurrection are included. St. John, falling on his face in Revelation, completes the group.

The sculpture work done is only a beginning. In the 67½ acres of the Close is a wealth of trees, shrubbery, plants, and flowers which will be carved in the Cathedral structure, just as the border of the reredos of the Bethlehem Chapel is patterned after the Glastonbury Thorn, which grows on Mount Saint Alban and blooms at Christmas. Even poison ivy will have its place as a garland around the neck of a gargoyle representing Evil. Bees, ants, butterflies, and other insect life, birds and squirrels will be carved in the stones or in the wood of the choir stalls. All will have a symbolic significance.

Compared with the nudes of Greece, Gothic figures may seem prosaic unless one appreciates the ideal of the Christian builders of the Middle Ages; ideals adapted to the building of the modern Washington Cathedral. Greek art is full of sex. The Gothic cathedral builders regarded chastity as a fundamental part of the teaching of Christ, and they expressed it by making their figures spiritual. Forms of both men and women are usually draped. Thoughtfulness of expression was aimed at; sexual appeal was avoided. As A. Kingsley Porter says in "Beyond Architecture," "When forced by the nature of their subject to depict the nude, as in the cycles of Adam and Eve and the Last Judgment, the mediæval sculptors invariably contrived to deprive their figures of all sensual suggestion. . . . . Yet he would be a bold critic who would dare pronounce that any naturalistic figure ever produced in the golden age of the Renaissance was absolutely less lovely, possessed more grace or sweep of line, more charm, greater dignity, higher decorative significance." Consequently, the figure sculpture in Washington Cathedral is not sensuous. It does not suggest Rodin except for Rodin's "Thinker." It is intended as a guide to thought on a higher plane, contemplation of the infinite provoked by familiar symbols. It confirms the statement often made that Gothic is the most intellectual of architectures.

To complete the contrast with Greek art one must add the thought that Greek architecture was really a frame for the Greek sculptures. In Gothic the sculpture is subordinated to the architecture. One can, then, in the light of tradition, understand the builders of Washington Cathedral when they stress the beauty and proportions of the architecture as a "witness to Christ in the Capital of the Nation," and "a house of prayer for all people." The figures on the bosses must serve a definite subordinate purpose. They are only a part of a great intellectual scheme. But they help the individual to appreciate the greatness of the Cathedral enterprise and its wonderful variety of detail. The modern materialist may pass it by in favour of more obvious things. Its subtleties will remain a perpetual joy to the initiated.

Washington has hitherto, we believe, been the only capital city in the world without a cathedral church. The foundation stone of the cathedral now in course of erection, and illustrated in this issue, was laid in 1907, and it is estimated to cost ten million dollars. The centre arch will be 90 ft. high and the two side arches 50 ft. The central tower will be 262 ft. high.



"GARDEN WORK." "LABOURERS CARRYING CONCRETE." "SCULPTURE."

Concrete Statuary. MR. GILBERT BAYES, Sculptor.

[These panels were on a building at the British Empire Exhibition. The illustrations are from the clay moulds in which the concrete was cast.]

THE GREEKS—AND AFTER!—I

By REGINALD HALLWARD.

ARCHÆOLOGICAL discovery and excavation in recent years have so much enlarged the extent of our knowledge that the boundaries which have been supposed to enclose the history of art and the principles to be deduced from it have almost to be restated. It is only natural that for the majority, trained in the classical tradition, it is difficult to estimate or enter into the qualities of building which owes nothing to it. We have formed such a complete doctrine about the development of architecture from earlier times, that it has become for us a kind of "truth once delivered," holding us to an orthodoxy which allows little freedom to the spirit. Yet this advance of knowledge is as important to the understanding of art as has been the progress of science to geology.

The ideas of "progress" which obsessed Victorian complacency are found not to be true; it does not come that way and is to be looked for in others. And so for the arts; the idea of progress as something inevitable emerging out of one style into another, its consummation of course in ourselves, is also unworkable. If it depends not on such inheritance, and that though heirs of time—it is always possible to squander our inheritance—the sources of art must be looked for elsewhere. Yet precedent and authority impose their standards upon us as though we must for ever look outside ourselves. This persecution by precedent—which leads us to represent not what we actually feel about form and nature—but what we ought to feel—takes away the direct simplicity of impulse which is fundamental to the freedom of art. This really decadent view has sterilised art for the last century. There is, however, an awakening which should free us from this thraldom, in which archæological discovery comes to our aid.

Lovely as is Greek art at its best, sublime as are the ruins of Baalbek, we can no longer regard them as enclosing all that can inspire the mind and fire the imagination, for another vision comes from afar, which as it becomes more familiar tells of an imagination more embracing in its scope, more beautifully endowed. The great temple of Boro-Budur, built in the ninth century in Central Java, reveals through its architectural features and its superb sculptures an interpretation which may challenge anything Greek, and compares better with the more spiritually endowed Gothic of the twelfth and thirteenth centuries. There is, in fact, a good deal more kinship with Gothic in its human qualities; the sculptures of the Temple seeming to be formed by nature herself, so direct, simple and lofty is the grace which inspires them. The limits which we find in Greek architecture, the august but rather mechanical perfections of its nature, and the more impersonal abstraction of type, less informed with the spiritual, which we find characteristic of Greek form—for who would invest the Venus of Milo with a soul—sets the foundations of this ninth-century Buddhist art on a higher eminence raised as it is on the mighty inspiration of innocence and kindness.

The shape of the shrine of Boro-Budur may be described as that of a flattened and stepped

BORO-BUDUR TEMPLE SCULPTURES A.D. 900

pyramid, erected on a square base measuring 530 ft. each way. Ascending in a series of terraces flanked by walls, the three topmost tiers are circular, leading to the uppermost cupola which crowns the centre of the pile. More than 400 statues of the Buddha (many of them now either removed or mutilated) rest within deeply recessed niches above the terraces, the niches themselves and the architectural surroundings including sculptured reliefs of great beauty. In this brief account it is impossible to give more than a bare description of the superb character of these reliefs, which are carved in *alto-relievo* on the faces of the walls, and compare, in the deeply human character of the types represented, the tenderness of expression, in the purity of their form and wealth of design to the spirit animating the best period of the earlier Gothic work in Europe. It may be that the building belongs to that period which best expressed the most purified aim of Buddhism, a conception of God as one and single corresponding with the Christian idea. There is, however, but little to be known, and the work itself is the best argument for the nature of the belief. The principal sculptures are executed on the inner walls of the galleries up to the last three, and were they placed in a row their length would extend to between two and three miles. Originally there were between 2,000 and 3,000 of these beautiful reliefs, many of which have been lost or seriously mutilated. When we bear

in mind that throughout the whole series there is practically no repetition, that every figure has personal identity, every various tree form its own characteristics of leaf or flower, interpreted in the most lovely way, with a purity of feeling and vividness of realisation almost unsurpassable, some idea of the inspired character of the achievement will dawn upon us. Nor is there apparently any lessening of quality, but, on the contrary, as we ascend so does the wealth of realisation. Such work affects us as does the best period of Gothic: the outcome of a people inspired by an impulse that transmuted all their labours into gold. That is to say, its creation was largely communal, the consummation of that corporate identity in craftsmanship which, in rare periods of the world's tragic history has, for a brief spell, held all life together, as the witness of the height at which it was lived.

The architectural qualities are perfectly shaped to its environment, displaying themselves to the tropical sun in a mantle of light and shade accented to get the full effect of the contrast. The history and incidents recorded in the reliefs are those of Gautama Buddha, from birth to death, so that the pilgrim as he ascends through the terraces to the uppermost shrine has the whole story unfolded before him to inspire his worship. The wealth of ornamental detail of endless variety, no words here can describe, but whereas in Indian ornament we have often to feel an excess to the neglect of the more fundamental requirements of architectural form, there is here no such loss. The decoration is apportioned so as in no way to obscure the architectural character which it glorifies and emblazons. Mouldings, cornices, doorways, projections, gutters, rain-water heads, are all logically conceived and planned to fit the severe characteristics of the Shrine. Surrounding the lofty central dagoba are placed a series of bell-shaped cupolas, with pyramidal finials, or pinnacles. Of these there were originally 72, and at one time each held a statue of the Buddha. These cupolas are perforated with square and diagonal openings and the darkness formed by these perforations is repeated in fainter form by the use of different coloured stone in the masonry itself, producing a very rich design quality in the work.

The Dutch Government have, in recent years, recovered much of the stone and completed a considerable amount of well-achieved restora-

tion. A remarkable feature in regard to the methods of the building lies in the fact that no cement was used to hold the masonry together, which is cut with such exactness that it is often impossible to discern where the joints come between the stones.

But to return—what we now see is that the art of Greece reaches us as but one out of other civilisations now being opened out, such as that one which created Buddhist art in Java. No period of civilisation has been productive of great art in which custom and tradition has intervened between the artist and his freedom for direct expression, to record just as he is moved, not in any set manner conditioned by precedent and convention.

But how do these waves of civilisation come about?—which we find now to multiply themselves as archæology and excavation open out yet further horizons. From whence are the roots? We see that almost all religious expansion begins in revolt against gods and priests, conventions and authority, as the pent-up life spirit becomes moved through some great example. Men must live for more than the day, and the rise and fall of civilisations, their freedom to beauty, is only the measure whether the balance leans towards one or the other. No age can live for another, no time can inherit a security of virtue and greatness; its art grows out of its own. When I look at the architecture and sculpture of Boro-Budur, I do not

DETAIL FROM LOGGIA PORTAL LA SAINTE-CHAPELLE 13th century

look for Greek influence or any other to explain it. Nor could it be done any other way. If that is so, and it reaches a beauty so inspired and unconditional, are we right in justifying our own expression on stylistic precedent of form and manner? Have we not our own? Nevertheless—for I would not be misunderstood—traditions—really the virtues much more than the forms—hold the arts together. I see also that any vital period of building is found to depend on a reasonable standardisation of type, a unity of acceptance and resemblance for the forms through which we build, whether the church, the house, or the market hall. A living style (always unconscious to ourselves) cannot be in half-a-dozen. We may copy or plagiarise, and one architect will build in all the styles, but a living tradition for architecture points to an accepted and disciplined outlook, resting on a certain standardisation. Up to the end of the eighteenth century this was so. The Tudor period rests on a national acceptance of form, and working within it was enormously strengthened thereby. And so we reach the truth that this reconciliation to an accepted basis grows out of unity of belief. We are all seeking the same things. Creation, treatment, becomes marvellously identical, rather than different in all races, as the sculptures of Boro-Budur are in close relation to the Gothic spirit, or the best in Greek. Life at its highest closes in on a unity of impulse and feeling, its basic constitution being the same, and when liberated for the best, pours forth its praise of life in one voice.

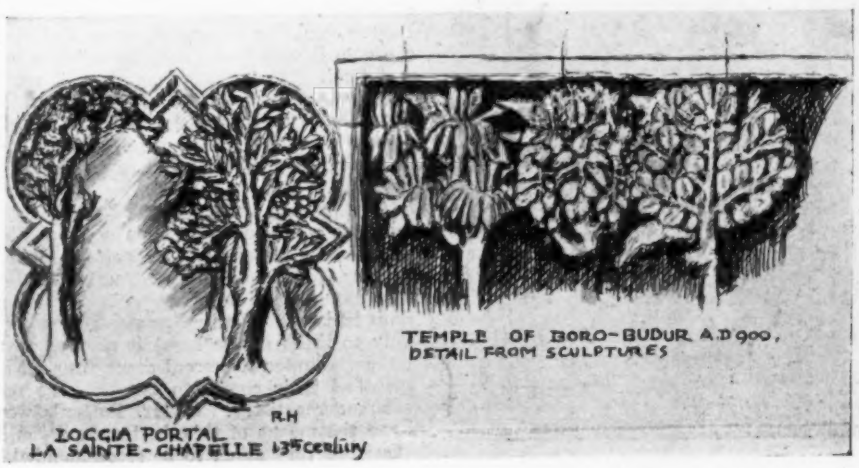
The little illustrations which accompany the text, inadequate as they are to represent fully the subject—and they could be multiplied indefinitely—will yet serve to explain what I have said. The tree forms gathered from the sculptures of Greece, 500 B.C., Java, A.D. 900, and France, thirteenth century, though different in externals of local character, are identical in feeling and equality of achievement, all full of the same uncorrupted love of nature and passion for beauty. Yet the Eastern art is not influenced by Greece, nor is the Gothic. The artist in each records just as he is moved, and the sources of beauty are found to lie in man himself. So with the illustrations of human forms, which are tied together by the same governing impulse, and are, therefore, identical save for the externals of dress and locality.

To the development of an understanding of the nature of art, into a more ordered and intelligent approach, these Eastern sculptures help us considerably. We do not now attribute fossils to some influence of the stars, or accept the suggestion that "shells on the high Alps were creations of the Devil to tempt intellectual pride towards damnation." So we ought not any longer to retain these superstitious origins for art, as of something outside of us and of our knowledge. To say that we are not an artistic nation, as we are often told, is not to offer any explanation. Why are we not? Have we observed all the causes which account for the flowering of beauty in a race? Art is always a natural growth and does not flower in a nation because of the wealth of its derived example, or patrimony, else ours should be the greatest of all. We inherit nothing that we do not deserve. Nor has the art of a country ever failed because of craftsmanship. Where there are great and ennobling beliefs nourishing a race they will always find the means for their expression. When art decays, it is because belief decays. Nor is national loyalty or patriotism any alternative. For there is no loyalty but that of loyalty to mankind. As has been said "of the best we are hardly conscious," and it may be doubted whether the sculptures of Boro-Budur knew themselves as art as we have come to understand it. It was the height at which they lived.

That art has followed a continuous upward progress from its earliest beginnings is seen, therefore, not to be the case. Civilisations succeeding one another, and compared, reveal in relation to time that there has not been this sort of progress; that earlier civilisations have in their culmination surpassed later ones. That their rise and fall is more like to the waves of the sea, attaining different heights as the beliefs informing them were more purified in one instance than in another. But apart from this we find art can flower in a race without accepting the view that it is a matter of heredity and accumulated experience. The argument from experience, the empiric view based on accumulated knowledge, is wholly inadequate to explain the spontaneous emergence of beauty in a race. It does not and cannot reveal the sources of beauty which are creatively derived and only to be found in man himself. It is not, therefore, at second hand that art has grown, and the very vastness of our inheritance from the past is often the cause of its submergence—and in any case once there can have been no one to copy.

In the light of this it is interesting to quote the view of writers such as Anatole France, who, in "The Latin Genius," tells us: "It is an act of faith and of love for that Greek and Latin tradition wherein resides all wisdom and beauty, and without whose pale is nought but error and vexation of spirit." This, in the light of the revelations of archæology and exploration, is about as true as those superstitions concerning geology to which I have referred. John Ruskin, writing on the same matter, speaks as follows: "The Greek rules over the arts to this day, and will for ever, because he sought not for beauty, not first for passion or for invention, but for Rightness." Note the capital R, which is a challenge in itself; but such buttressing with the capital was, perhaps, necessary to emphasise a view so fallacious. For if the sources of art are to be found in man himself, how can Greece or Rome claim to rule over us in this way? Is the superb temple of Boro-Budur "nought but error and vexation of spirit"? Or why should we place our own birthright in pawn in such a manner. The sources of art, then, do not come from Greece, and it is a very grave misunderstanding to think so, because we find them emerging through civilisations, as archæology and excavation reveal them, hundreds of years before Greece, and at a later time in directions which never came under her influence. It is not possible to suggest that the sculptures of Boro-Budur reveal any influence derived from Greece. As man himself is the source from whence thought, beauty, religion and truth for ever flow, the mainspring resides in himself, and art only emerges nationally when it seeks to represent "things and persons not as tradition said they should be represented, but as they actually saw them." And never has a national art flowered into real greatness except in such a way.

There is a particular reason why at the present time we should avoid these contracted origins for art, because it confines the scope of our view into too narrow a channel, and hides from our eyes the gravity of the decay of craftsmanship. The very fact that it is so difficult for those trained in the classical tradition to include a more world-embracing survey, goes to point the urgency of our horizons being extended. Based as are our present contracted views on theoretic and scholastic knowledge, the secrets of the vital interpretations of art are not disclosed, and to reach them we must get down to craftsmanship again. Tradition, precedent, authority—none of these give us beauty in themselves, because they are not ourselves. Only what we give, what is born again in ourselves, answers the needs of art. And though we have all the knowledge, and all the styles, and all the eminence that may accompany them, we are but walking in a vain shadow so long as we neglect this fundamental need.



ARTISTIC HERALDRY

"We choose this title as representing something different from the heraldic devices in most common use at the present time. We are fortunately not any longer taking things for granted, nor are we satisfied that the things which belong to beauty should so little fit its requirements, so that any effort to restore the standard of heraldic design to include a more becoming artistry is of no little importance. Public schools and universities, corporations and City companies, hospitals, &c., will therefore find interest in the heraldic leather work of Mr. J. D. Batten and Mr. Stanley W. Bott, which introduces a new and improved standard for work of this kind. The well-known study of technical methods with which Mr. Batten's fine craftsmanship has always been identified should ensure an interest for work of such sound and becoming character.

A recent exhibition of heraldry held at the Macrae Galleries by these craftsmen revealed the excellence of results gained through a better appreciation of the decorative possibilities of emblazonments, the metals and colours used yielding most satisfactory results. We may also refer to the "Short Period" exhibition at Wembley, of heraldic leather work by Mr. Batten, which gave an opportunity for many who appreciate the results lying in a sounder craftsmanship to see the great difference noticeable where it is informed by this better spirit.

The idea occurred—so Mr. Batten tells us—while doing the leather curtains for the reredos in Hillingdon Church, near London, reproductions of which appeared in these pages some time ago.

Starting on the shields of the Cambridge Colleges, Mr. Batten has since done some Oxford shields. Sir W. H. St. John Hope has made such a special study of the heraldry of Cambridge, publishing the results in the papers of the Cambridge Antiquarian Society, that no further research was necessary, as the artist had the very best authority for all points of heraldry in such authoritative information. There does not, however, appear to be any work of equal authority dealing with the heraldry of Oxford.

We are told that in doing this work the artist has been very much convinced of the soundness of the old heraldic rule which forbade metal on metal, or colour on colour. This "heraldic impossibility" does not apparently rest on technical grounds, but arises from the lack of contrast between silver and gold which would make it difficult to differentiate at any distance the heraldic interpretation. Some of the College Arms are not heraldically commendable, though Mr. Batten tells us, "I have not found a single shield that looks bad and they all hang together well side by side." We cannot do better than to continue in the artist's own words, in which he describes some particulars of his work:

"The leather is oxhide and I buy it from a firm whose name is a guarantee that it has not been dressed with sulphuric acid, a treatment which converts a material of astonishing strength and endurance into one of the feeblest and most corruptible, as any librarian in the Kingdom will vouch with tears.

"The great advantage of leather for heraldic work is this—that when damp it takes quite easily the slight indentation and relief which is appropriate to heraldic forms and that it retains this relief as it dries. The wealth of this advantage will be best realised by any who may have had to represent heraldry on a flat and unyielding surface. The choice before him will have been either to represent the lions, roses, crowns (or whatever the charges may be) by a flat silhouette of colour, or metal on a flat field of metal or colour, or else to depict the lions, &c., in shaded colour or shaded metal. By the former method he will be precluded from using either the metal or the colour to its full beauty; by the latter method, he will be always under temptation to give to the charges a greater

The Badges on this page are from the Oxford Colleges.

naturalism than is appropriate to the spirit of heraldry.

"But if working on leather, he will be able to mark in quite easily the lion's jaw and ears, his mane, and the shaggy tassels of his limbs, or the bands and jewels of the crown, or the over-curling petals of the roses, and over this to lay the metal leaf or the coat of colour, and the work will need nothing more for completion than a simple outline. He will also be able to indulge in the delight of an indented diaper on the gold or silver fields."

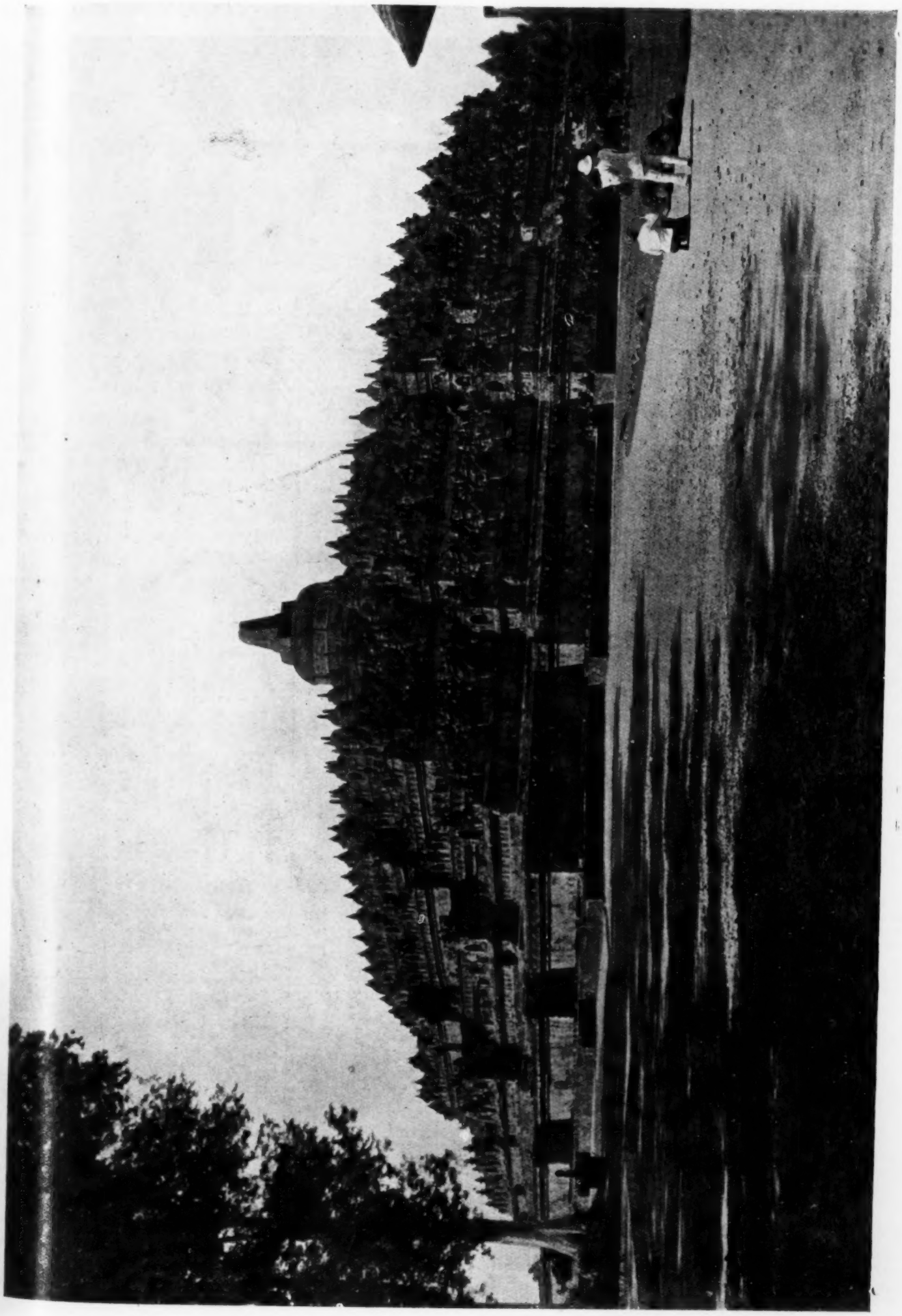
"I have not had to hunt for delicate nuances of colour. The red is vermilion; the blue, Burton's cobalt; the green, oxide of chromium; the gold is gold leaf; and the silver is a white metal foil (an alloy of aluminium, I am told), which naked is, to my thinking, an ugly metal, but which can be transformed to beauty by a coat of lacquer. I have much more confidence in shellac or button lac than in the bleached material."

All this seen in the light of sound technical methods and good design (so noticeable in the illustrations included) is important in restoring a more traditional and satisfactory craftsmanship to the art of heraldry, which has in recent days had so little to recommend it. We have only to think of the heraldic devices on which undergraduates at present depend for the adornment of their rooms to perceive the need of a sounder artistry. In Mr. Batten's work we have the means of this better result, and it is therefore very much to be recommended.

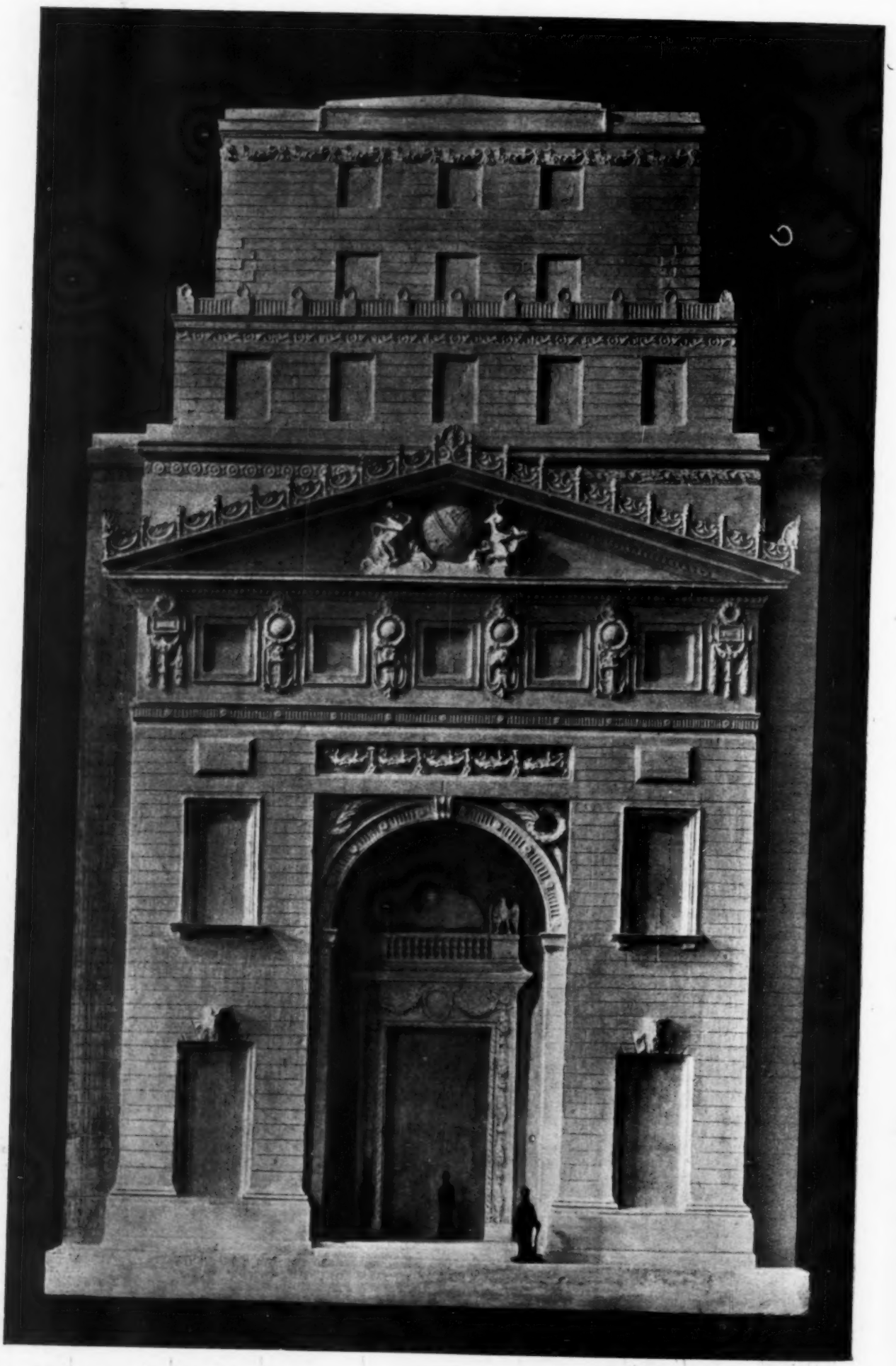
EXHIBITION NOTES

CURRENT EXHIBITIONS.

Our impression of the retrospective exhibition which the New English Art Club is holding at the old County Council buildings in Spring-gardens is that it hardly does full justice to the pictures which have been produced during the period selected, 1886 to 1924. That there is so much exhibited which is unlikely to live may seem a little disappointing, but it is a useful corrective to our vision when we come back again to work which at first arrested and interested us to find that the glamour has so largely disappeared, and that of beautifully serene, permanently valuable pictures there are so few. The newly-opened exhibition of the Pastel Society at the Royal Institute Galleries is perhaps still more quickly discounted in value, for surely some ninety per cent. of the exhibits are almost devoid of charm or interest, and one can hardly expect many to figure in another retrospective exhibition of forty years hence. In both these exhibitions we have to lament the absence of pictures which express the sincerity and pleasure of the artist in his work; between the dull and uninspired and the theatrical it is not easy to find any true reflection of art. The chief interest in the Pastel Exhibition is to be found in the work of Melton Fisher, Wm. Redworth, Leonard Richmond, Frank Gillett, T. T. Blaylock, H. D. Richter, and Leonard Squirrell. The exhibition as a whole is, however, singularly inexpressive of the medium from which it derives its name. If we revert to the Spring-gardens exhibition we find that the same dubiety of aim has affected our artists for many years; they have been busy making pictures and aiming to produce what the public might like, forgetful that the expression of beauty and truth in an individual and interesting way should be the real aim of the artist. "The Oak Staircase," by Sir David Cameron, the "Nocturne," by Whistler, and the fine picture of "A Summer's Day," by Wm. Stott, are outstanding qualities in a disappointing exhibition. The transformation of the rooms at Spring Gardens to the purposes of picture hanging illustrates a partial adaptation of top-side lighting, as so fully described and illustrated by Mr. Hurst Seager. In the R.I.B.A. *Journal* of 1912 the complete system is described as demanding (1) that the fullest light should be directed on to the picture wall; (2) that the light should be from one source only; (3) that the source of light should be invisible to the spectator; (4) that the best position for viewing the pictures must be in a relatively subdued light. At Spring-gardens it has been possible to fulfil throughout only the first and partly the fourth of the above conditions. The best was done under the circumstances, but by having top-side skylights on each side of the room the effect of the system is considerably modified.



The Temple of Boro-Budur, Java. (See p. 46.)



New Premises for Lloyd's · Model of Main Entrance in Leadenhall-street.

SIR EDWIN COOPER, F.R.I.B.A., Architect.

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ILLUSTRATIONS

"THE BUILDER."

This week's issue of "The Builder" is the largest ever published, and readers posting copies are advised to note that in the United Kingdom a copy must be sent by parcel post, and the cost is 9d. The postage abroad, as printed matter, is 8d. per copy. Also owing to the postal regulations, our Calendar, the District Surveyors' Map, and an inset sheet are being sent to subscribers separately.

"The Builder" Calendar.

Our Calendar this year is from a drawing by Mr. T. Raffles Davison, of Liverpool Cathedral (Sir Giles Gilbert Scott, R.A., architect) as it will appear when completed.

Washington Cathedral. MESSRS. FROHMAN, ROBB & LITTLE, Architects. (*See p.* 44.)

District Surveyors' Map.

A map is given of the County of London showing the boundaries of the Surveyors' Districts under the Building Acts, together with the names and addresses of the District Surveyors.

New Building for "Lloyd's," Leadenhall-street.

It is not too much to say that the work of Sir Edwin Cooper, F.R.I.B.A., the architect of Lloyd's new building, is of steadily increasing interest. The appreciation of breadth and dignity which has from the first been a characteristic feature of his designs, and his outstanding ability in the laying-out of plans, are things of the utmost importance in the large buildings which have come under his control. It is evident also that in his practice the interest of refined and beautiful detail is to be counted on to give an added value to his forms and masses. The illustrations we give to-day are evidence that Sir Edwin will not fail to rise steadily towards the measure of his opportunities. The interior views are especially pleasing, showing effects of telling proportion and dignity accentuated with a restrained enrichment of ornamental detail, whilst the exterior views promise building frontages which will not be lacking in breadth and distinction.

These illustrations show the sketch drawings for the proposed new building which we referred to in our Note of October 17. The building will be the new home for Lloyd's, and accommodation is provided on the upper floors for members of Lloyd's and the different Companies associated with them. The foundations are now in hand, and have been entrusted to Messrs. John Mowlem & Co., Ltd. At a later date we hope to be able to give the developed drawings and full description of this great undertaking. The photograph of the model shows the principal entrance in Leadenhall-street, from which the corridor approach leads direct to the Great Room.

Hertford War Memorial.

Sir Aston Webb, R.A., & Son, are the architects for the Hertford War Memorial.

Britannic House.

Britannic House, in Finsbury-circus, E.C., is the new office building for the Anglo-Persian Oil Co., Ltd. Sir Edwin L. Lutyens, R.A., is the architect.

Clare College, Cambridge.

These new memorial buildings at Clare College, Cambridge, are the first portion of a new court to form a memorial to a former student of the College who fell in the war. The proposal is ultimately to enclose three sides of a rectangular court, and the new buildings illustrated in this issue comprise the main front block and a portion of each of the two shorter sides. Sir Giles Gilbert Scott, R.A., is the architect. Other illustrations of this work were given in our issue for December 12 last.

New Buildings for the Port of London Authority.

We illustrate this week the main entrance to the Tobacco Warehouse Offices, at Royal Victoria Dock; the main entrance to the Warehouse Keeper's office, at King George V Dock; two police houses at Tilbury; and the Dockmaster's Office at the Pierhead, at King George V Dock, for the Port of London Authority. The architect is Sir Edwin Cooper, F.R.I.B.A.

The Dockmaster's Office, at King George V Dock, is a small and interesting building erected at the entrance to the Dock, and is in keeping with the other work being done by the Authority. The materials are sand-faced bricks and pantile roof.

The interesting detail of King George V Dock shows the entrance to the Warehouse Keeper's offices, treated in a simple manner yet expressing the dignity one ought to look for in buildings erected by the Port of London Authority. The materials are sand-faced bricks and Portland stone. The contractors were Messrs. John Mowlem & Co., Ltd.

The two police houses at Tilbury are taken

"FILLING MOULDS."

Concrete Statuary. MR. GILBERT BAYES, Sculptor. (*See p.* 45.)

from a group of buildings designed for the accommodation of the Dock Police, and erected by the Authority. The character and handling of the materials show great restraint. The whole of the group of buildings was erected on light concrete rafts, the walls being faced with sand-faced bricks and the roofs covered with plain tiles. Messrs. John Mowlem & Co., Ltd., were the contractors.

Drawings of the Tobacco Warehouse at Victoria Dock were recently illustrated in *The Builder*, and we now give a photograph of the main entrance, which carries on the character of some of the earlier Dock buildings, the materials used being sand-faced bricks and Portland stone. The contractors were Messrs. Walter Lawrence & Sons, Ltd.; electric lighting by Messrs. Higgins & Griffiths, Ltd.; water and gas mains by Messrs. Mumford, Bailey & Preston, Ltd.

The Horsley Laboratories.

These laboratories, at Bedale School, were erected from funds placed at the disposal of the Governors by Lady Horsley, as a memorial to her son, who was associated with the school first as a pupil and later as a master. The work was carried out by direct labour controlled by the Headmaster, Mr. Badley, and the Estate Manager, Captain T. Smithies-Taylor. The buildings were opened by Lord Horsley. The architect is Sir Edwin Cooper, F.R.I.B.A.

Washington Cathedral.

A description of the new Washington Cathedral is given on p. 44.

Nos. 32-38, Osnaburgh-street, N.W.1.

This new factory building is being erected for Messrs. D. Burkle & Sons. The materials used in the front elevation are Portland stone, with red brick facings and metal casement windows, and the roof is covered with green Westmorland slate.

The general contractors are Messrs. J. Willmott & Sons, Ltd. Amongst the subcontractors are: Steelwork, Messrs. Smith Walker, Ltd.; casements, Messrs. Crittall; asphalte, Messrs. Lawfords; lift, Messrs. Stigler Lifts, Ltd.; stone stairs, Messrs. Empire Stone Co., Ltd. The architects are Messrs. Yates, Cook & Darbyshire.

House at Hamble: Hall. MESSRS. BAILLIE SCOTT & BERESFORD, Architects.

House at Hamble: First Floor Corridor.
MESSRS. BAILLIE SCOTT & BERESFORD, Architects.

New General Post Office Building at Singapore.

We reproduce in this issue some photographs of a plaster model of the new General Post Office Building which is now being constructed entirely in concrete and reinforced concrete at Singapore, Straits Settlements. The architect for the building is Major P. H. Keys, D.S.O., F.R.I.B.A., and the contractors in charge of the work are Messrs. Perry & Co. (Overseas), Ltd. The reinforced concrete plans are being prepared by Messrs. Edmond Coignet, Ltd.

The principal façade will be 446 ft. long, and the maximum width of the building is about 204 ft. The building is estimated to cost about one million pounds. All the external facings are to be carried out in a special artificial stone made with granite chippings and white cement.

New London Buildings.

We also give views of some buildings recently completed or now nearing completion, in London.

House at Hamble.

This house is built in the Georgian manner for Captain Lubbock, the author. It is situated on an excellent site overlooking Southampton Water, with fine views to the south. The builder is Mr. H. G. Ross, of Netley Abbey, and the facing bricks were supplied by Sir T. Lawrence & Son, of Bracknell; the sanitary fittings by Messrs. Pontifex, and the leaded lights by Messrs. George Wragge, of London. Messrs. Baillie Scott & Beresford, of 8, Gray's Inn-square, W.C., are the architects.

House at Mudeford.

This house is also in the Georgian style, built in an economical manner so essential in these days of high prices. The house represents an attempt to get certain accommodation at the lowest possible price with some character. The builders were Messrs. F. Luxton & Son, of Highcliffe-on-Sea, Messrs. George Wragge, of London, supplying the casements. Messrs. Baillie Scott & Beresford are the architects.

New Premises for the Auctioneers' and Estate Agents' Institute.

A description of this building is on p. 70,

Hertford War Memorial.

SIR ASTON WEBB, R.A., & SON, Architects.

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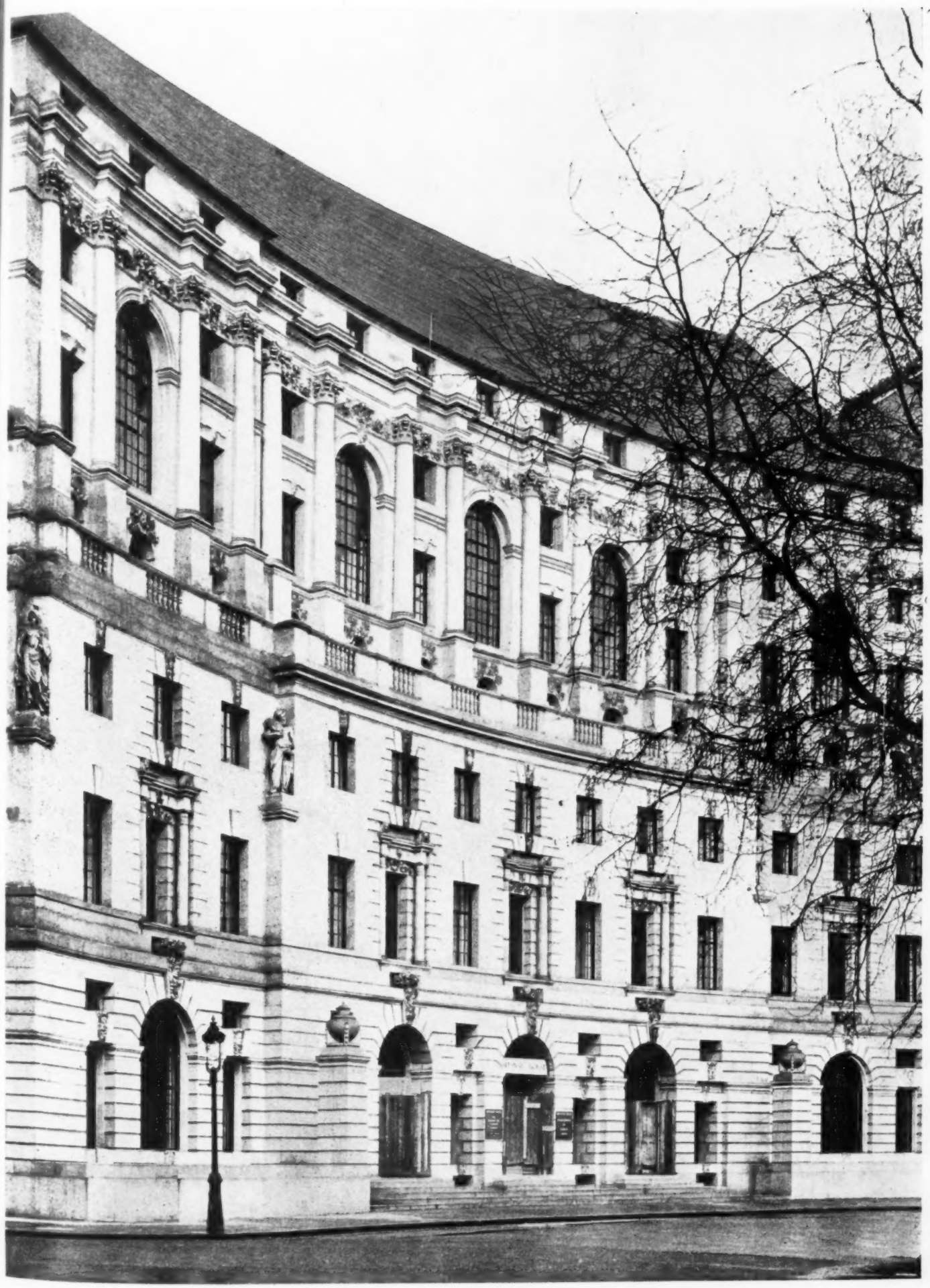
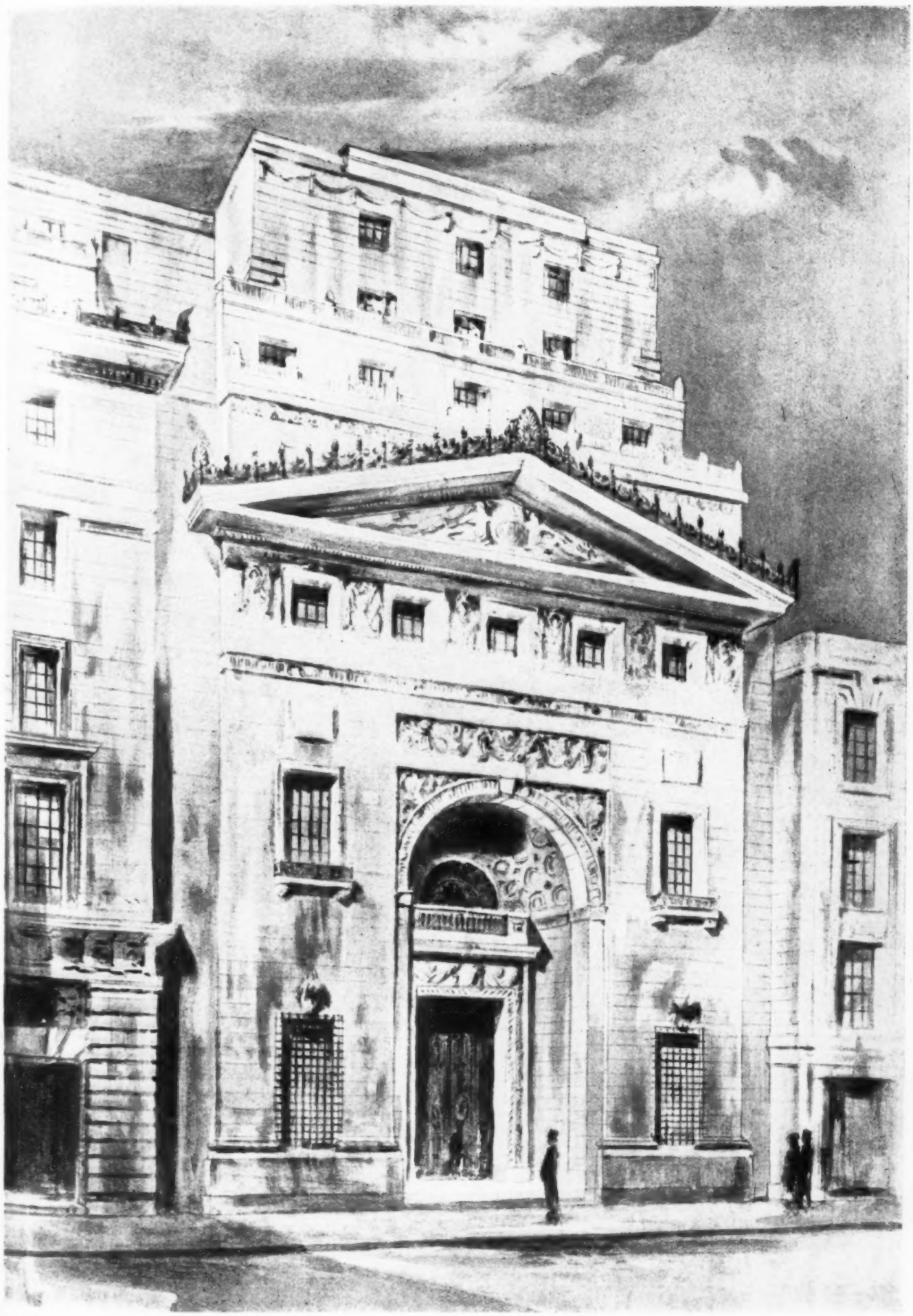


Britannic House : New Premises for the Anglo-Persian Oil Co., Finsbury-circus, E.C.

SIR EDWIN L. LUTYENS, R.A., Architect.

Architectural



New Premises for Lloyd's: Sketch of Main Entrance in Leadenhall-street.

SIR EDWIN COOPER, F.R.I.B.A., Architect.

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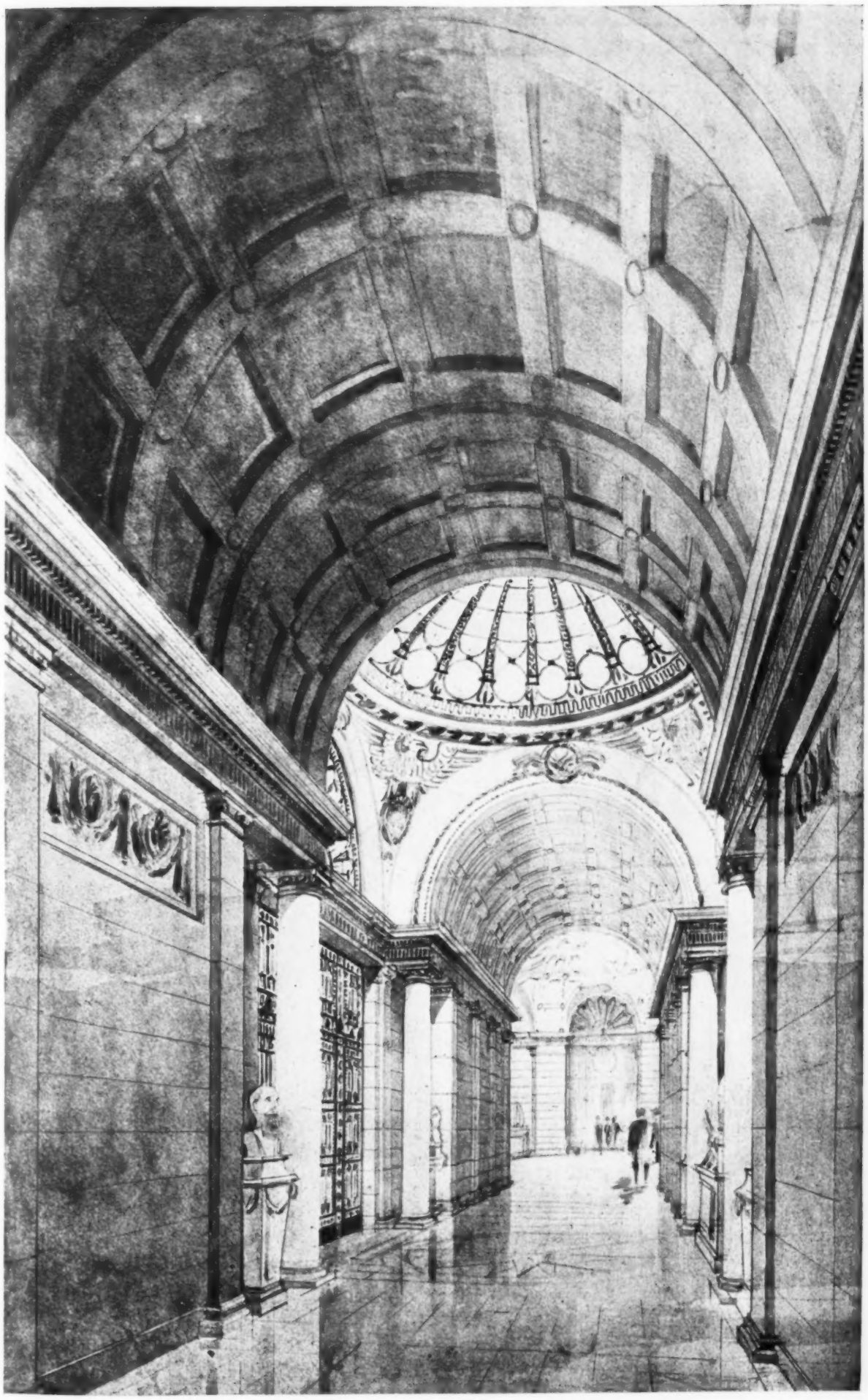
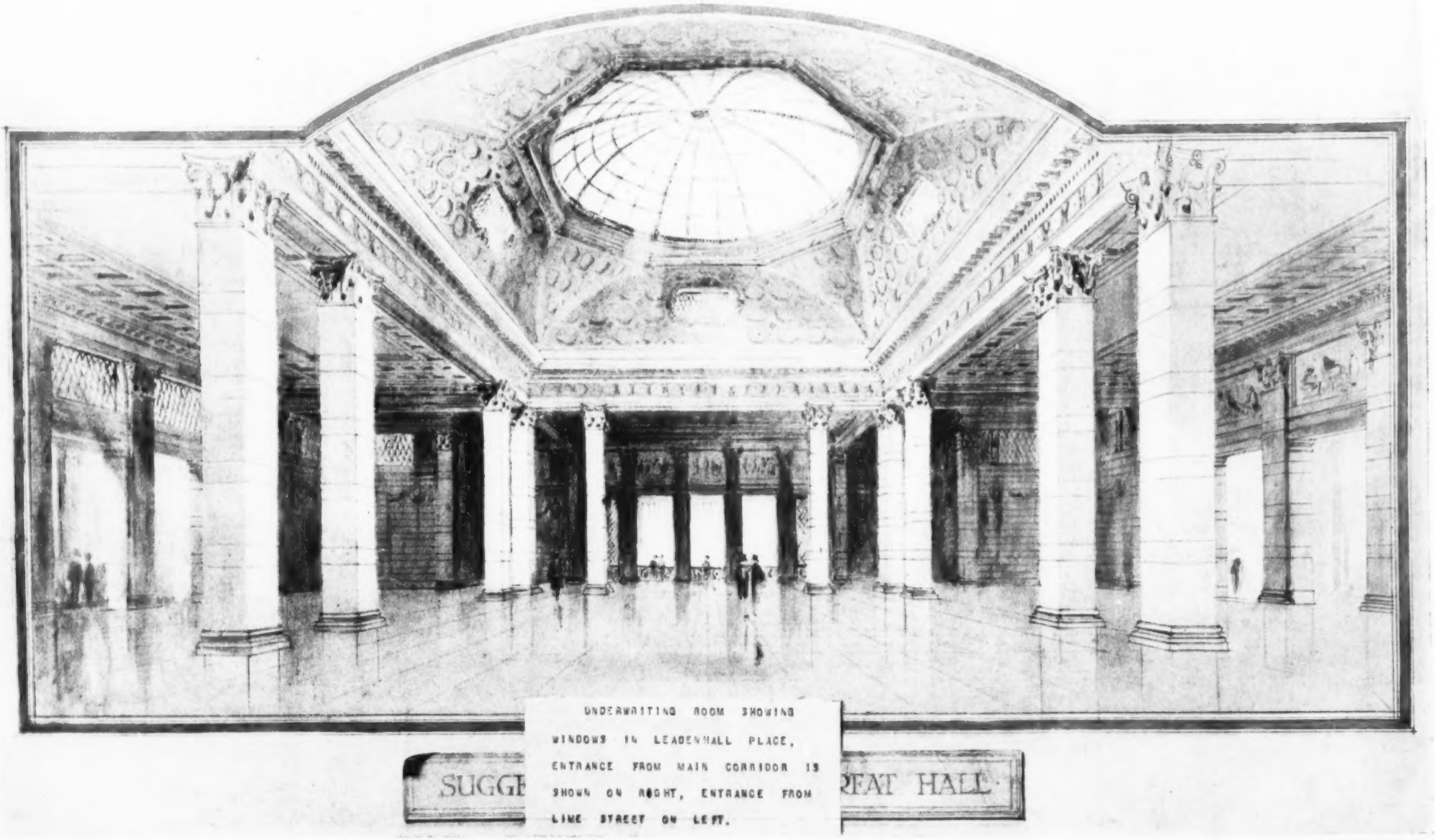


Lloyd's New Premises: Sketch of Approach to "The Room" from Leadenhall-street, E C.

SIR EDWIN COOPER, F.R.I.B.A., Architect.

Architectural
Library



Sketch of "The Room" at Lloyd's New Premises, Leadenhall-street, E.C.

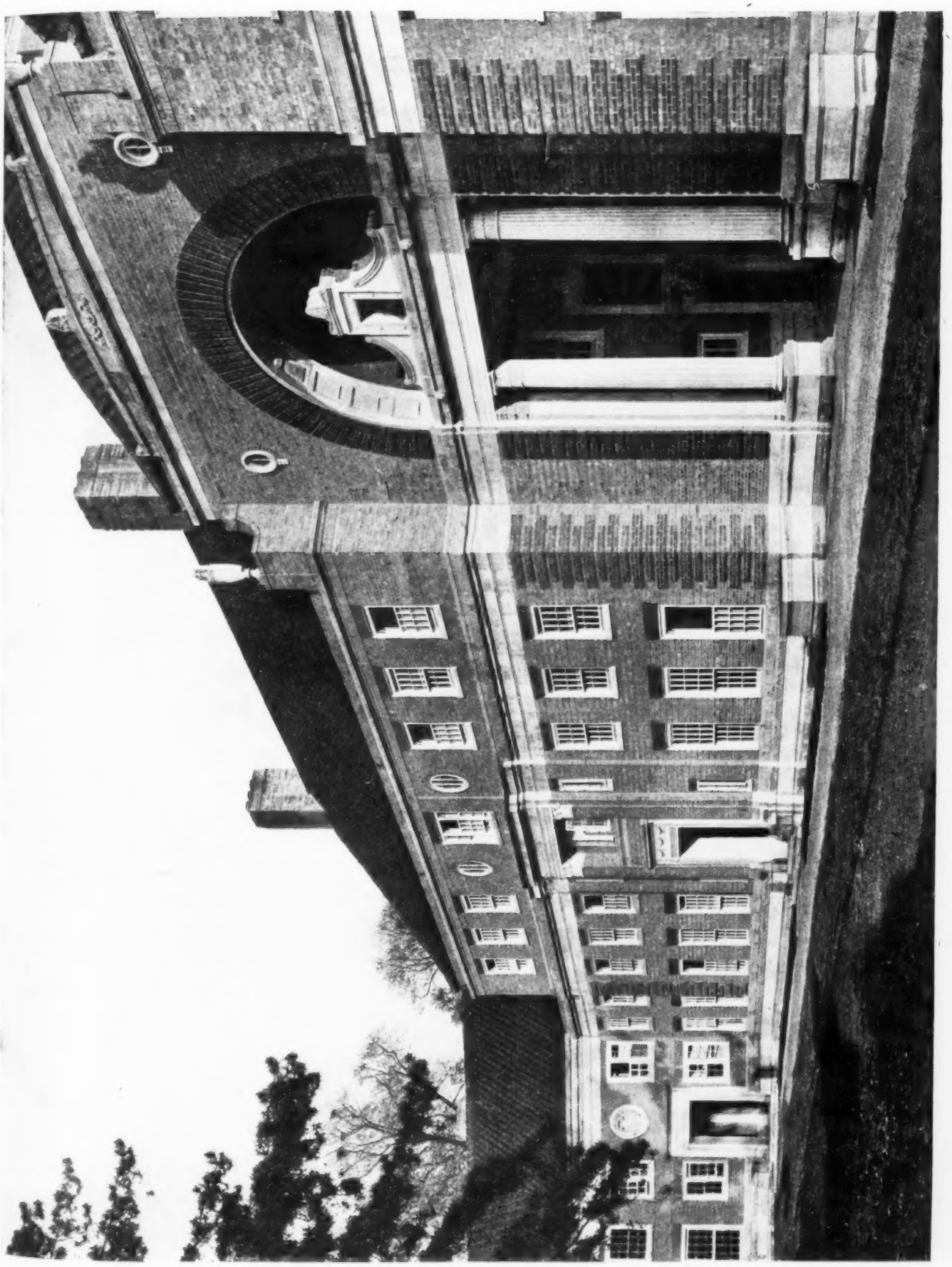
Sir Edwin Cooper, F.R.I.B.A., Architect.

Architectural
Library

FRONT ELEVATION.

Clare College, Cambridge: New Memorial Buildings. SIR GILES GILBERT SCOTT, R.A., Architect.

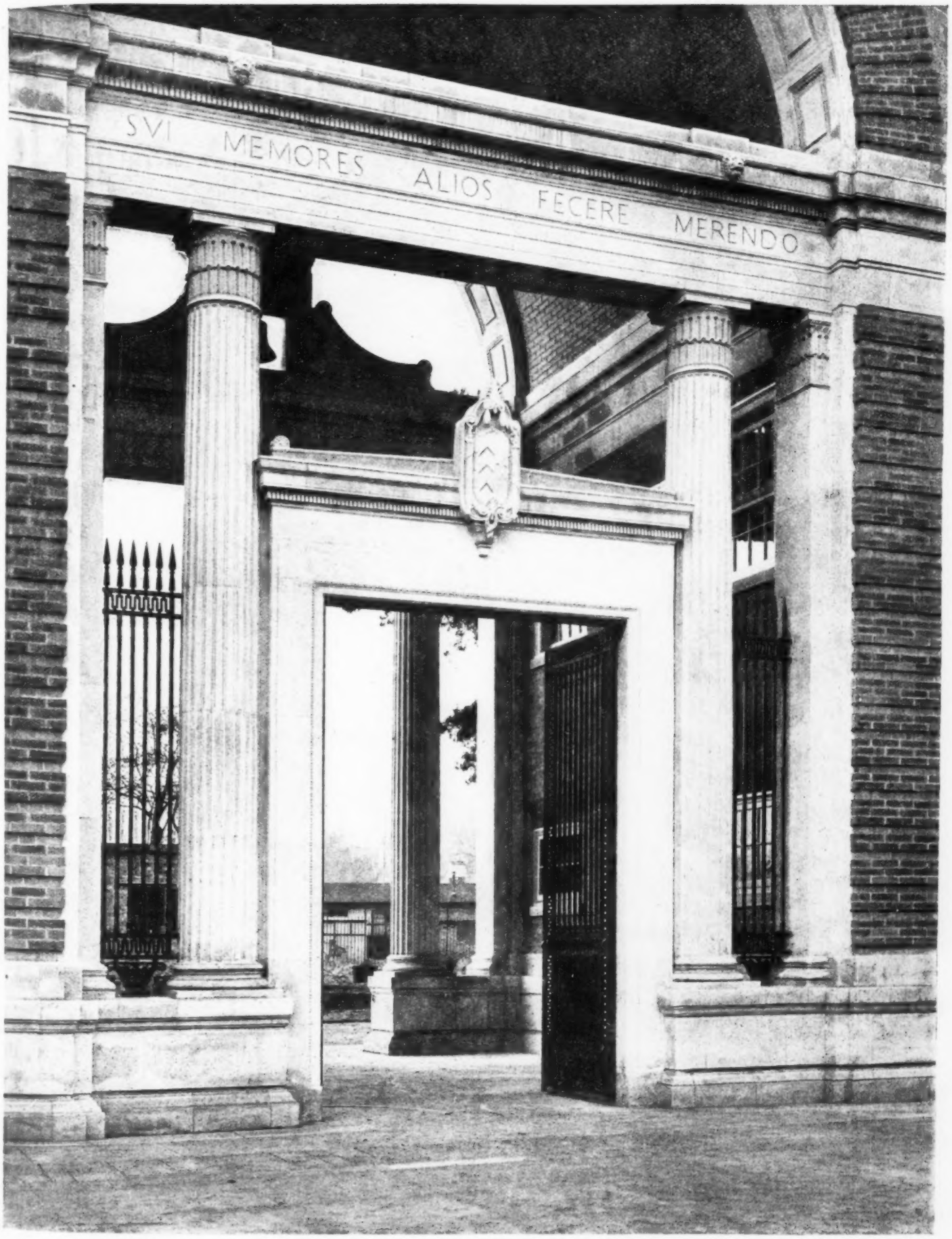
Architectural
Library



PORTION OF WEST FRONT.

Clare College, Cambridge: New Memorial Buildings. SIR GILES GILBERT SCOTT, R.A., Architect.

Architectural
Library

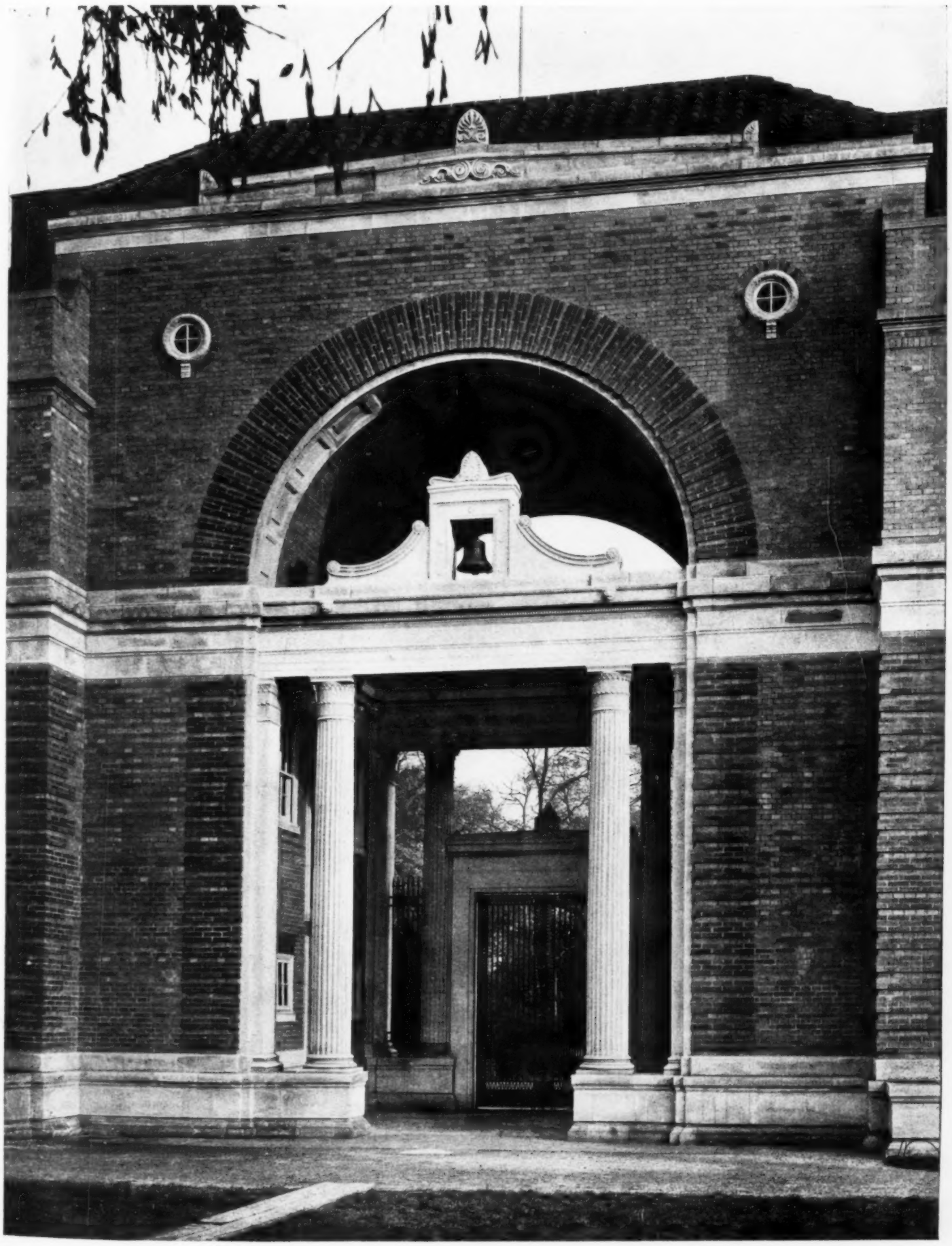


THE MEMORIAL ARCH.

Clare College, Cambridge: New Memorial Buildings.

SIR GILES GILBERT SCOTT, R.A., Architect.

Architectural
Library



THE MEMORIAL ARCH.

Clare College, Cambridge: New Memorial Buildings.

SIR GILES GILBERT SCOTT, R.A., Architect.

Architectural
Library

Main Entrance to Warehouse Keeper's Offices, King George V Docks, for the Port of London Authority.

SIR EDWIN COOPER, F.R.I.B.A., Architect.

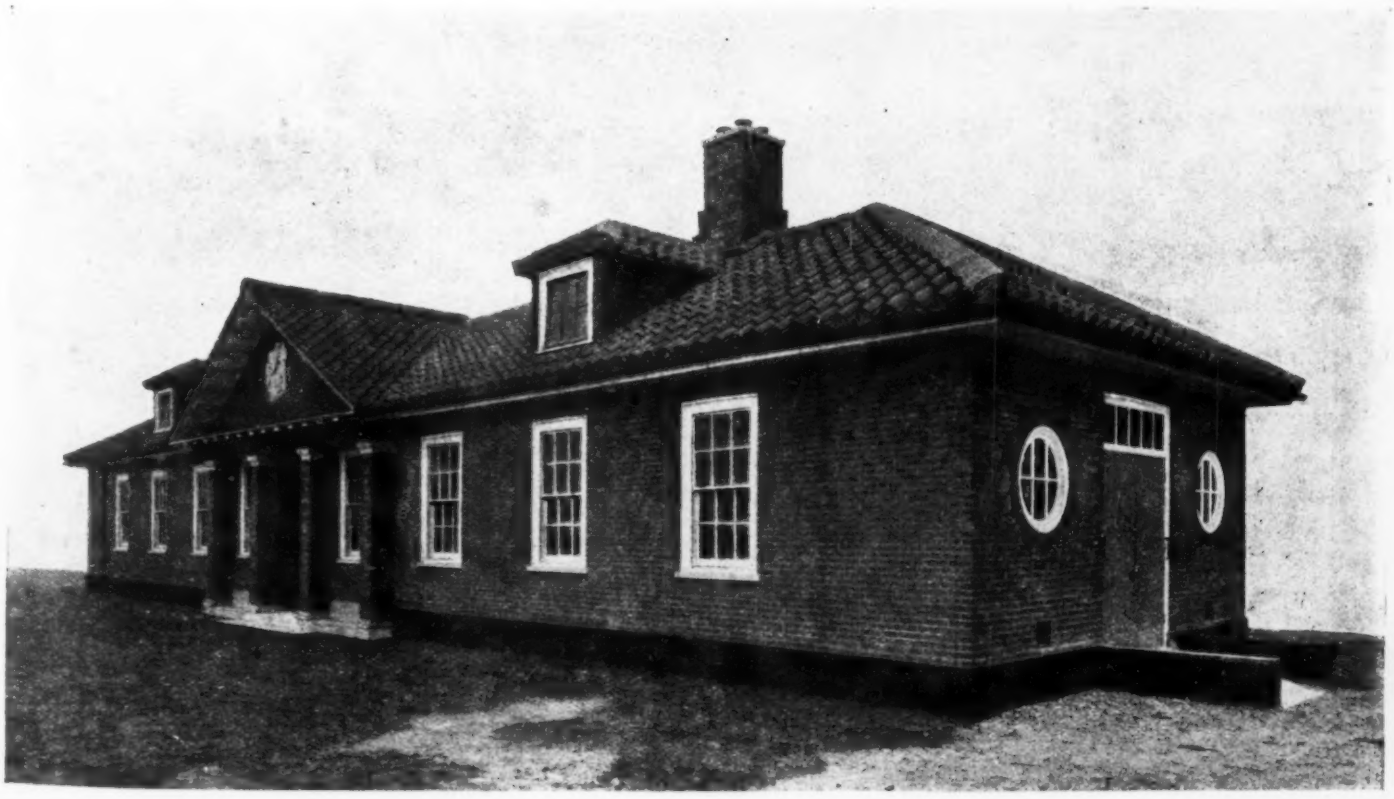
Architectural
Library

Main Entrance to Tobacco Warehouse Offices, Royal Victoria Dock, for the Port of London Authority.

SIR EDWIN COOPER, F.R.I.B.A., Architect.

Architectural

TWO POLICE HOUSES, TILBURY.

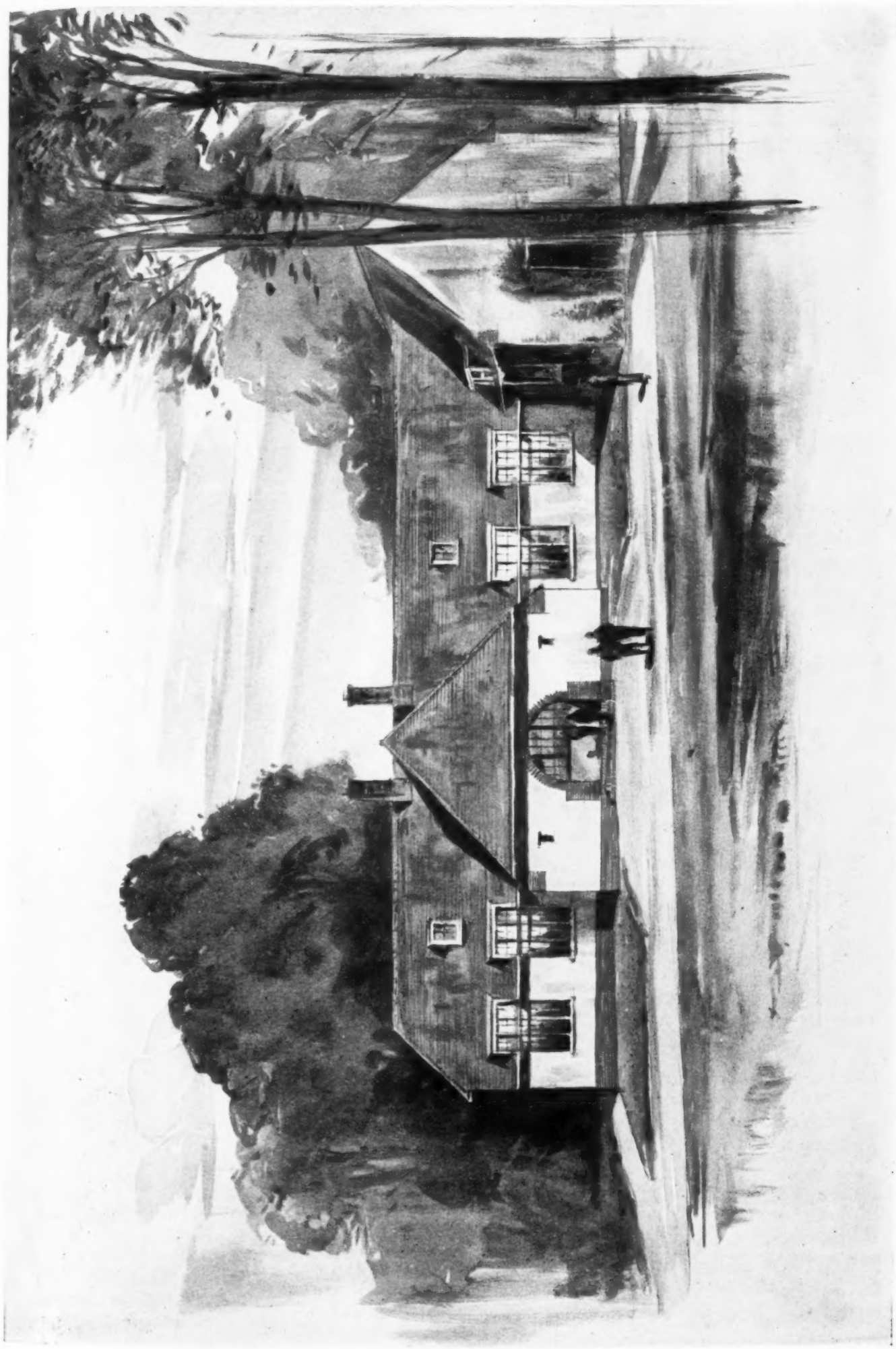


DOCKMASTER'S OFFICE, PIER HEAD, KING GEORGE V DOCK.

New Buildings for the Port of London Authority.

SIR EDWIN COOPER, F.R.I.B.A., Architect.

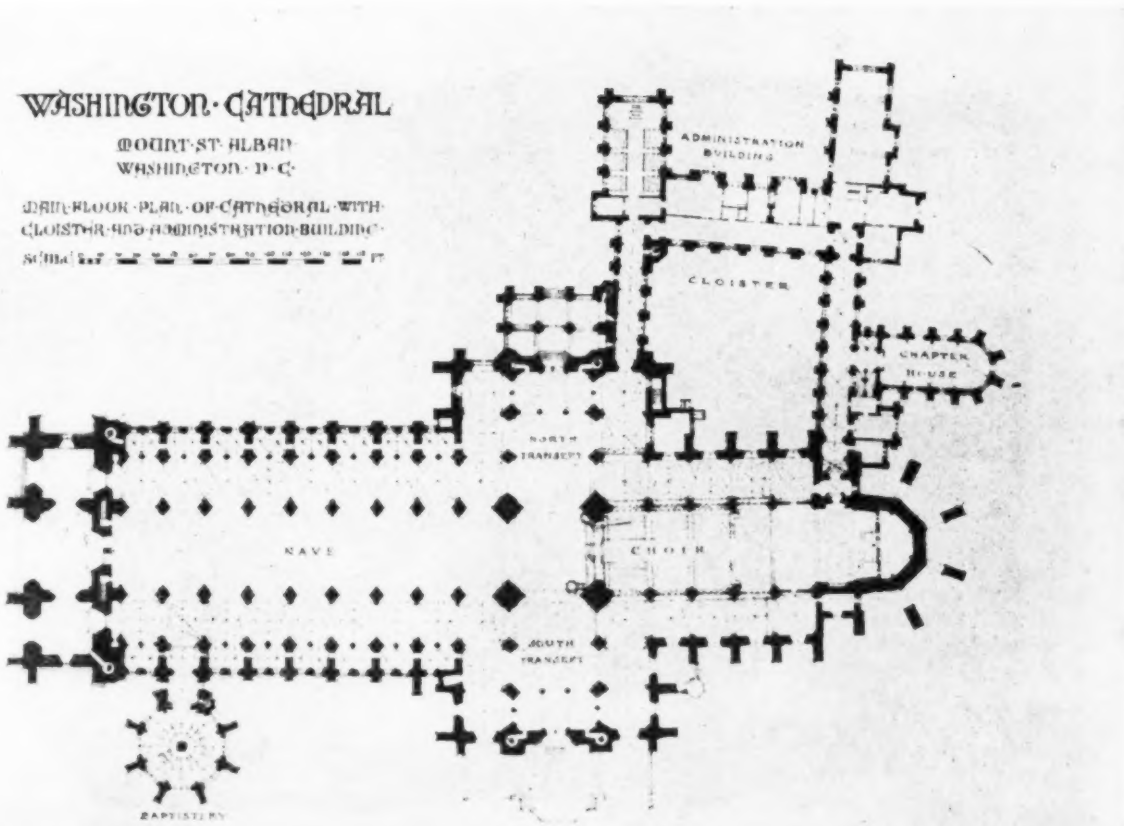
Architectural
Library



Horsley Laboratories, Bedale School, Petersfield, Hants. SIR EDWIN COOPER, F.R.I.B.A., Architect.

Architectural
Library

South View.



Washington Cathedral. Messrs. Frohman, Robb & Little, Architects.

Architectural
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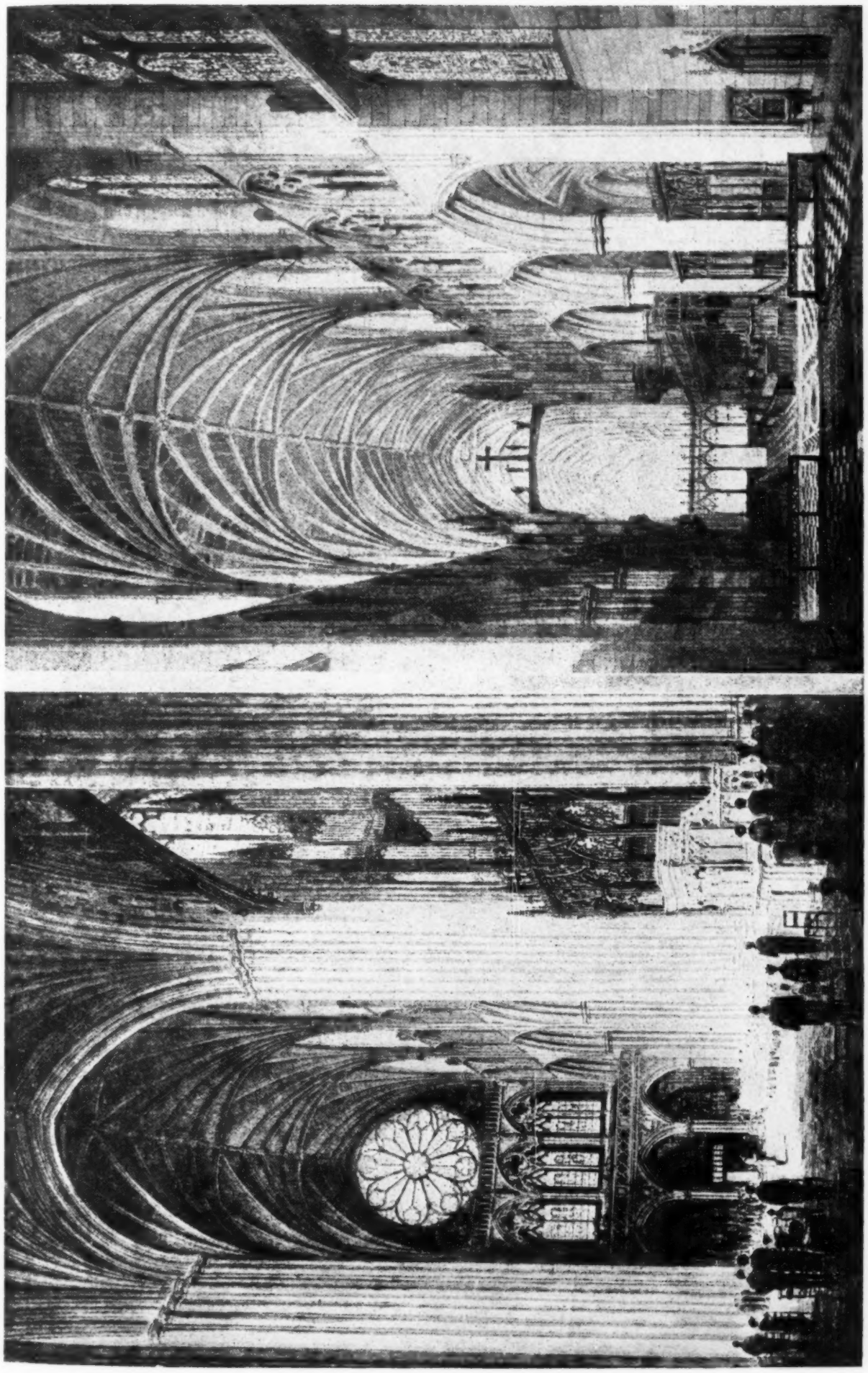
THE NAVE.

Washington Cathedral. MESSRS. FROHMAN, ROBB & LITTLE, Architects.

Architectural



THE CHOIR.

THE TRANSEPT.

Washington Cathedral. MESSRS. FROHMAN, ROBB & LITTLE, Architects.

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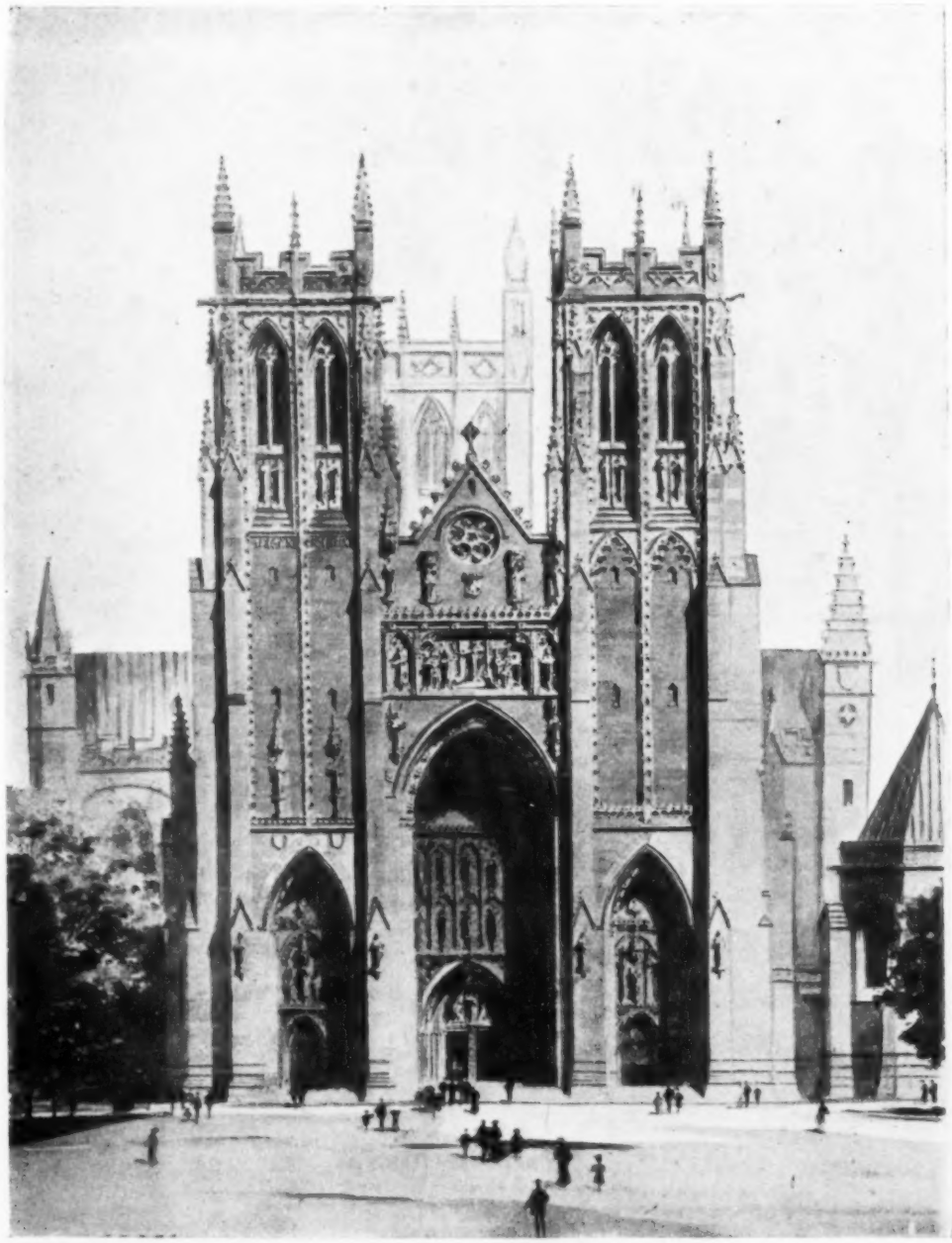
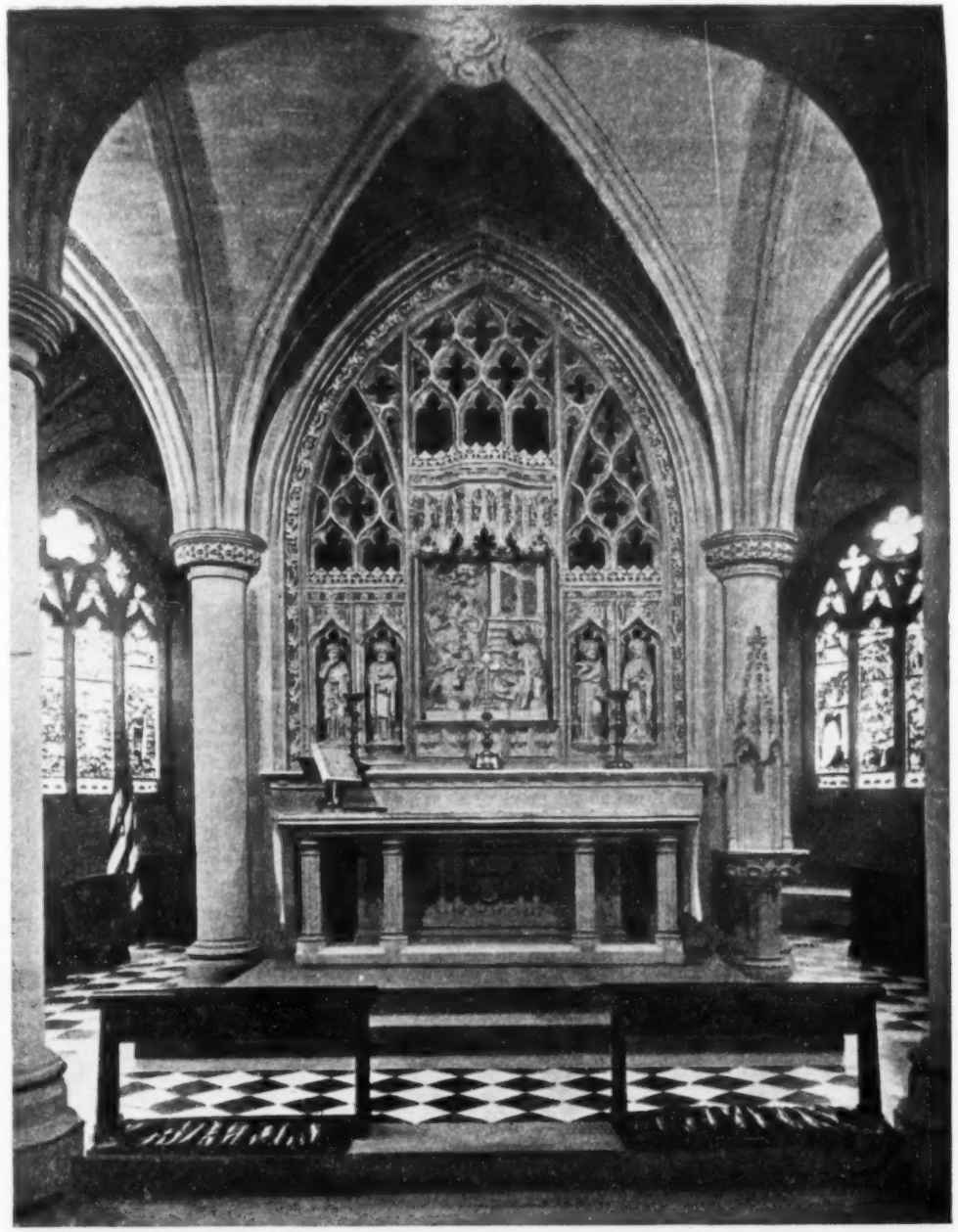


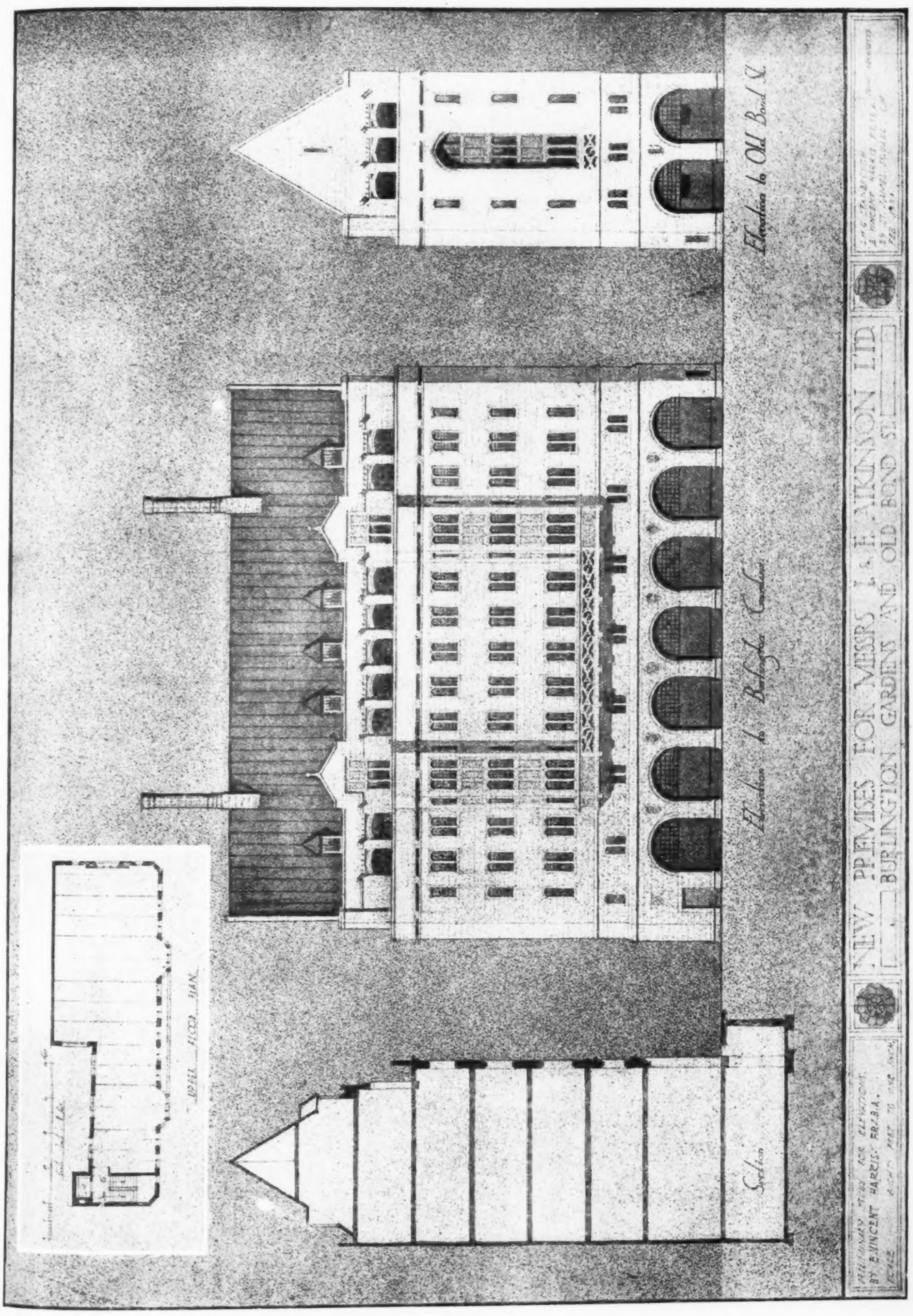
WEST FACADE.



VIEW IN THE CRYPT.

Washington Cathedral. MESSRS. FROHMAN, ROBB & LITTLE, Architects.

Architectural
Library

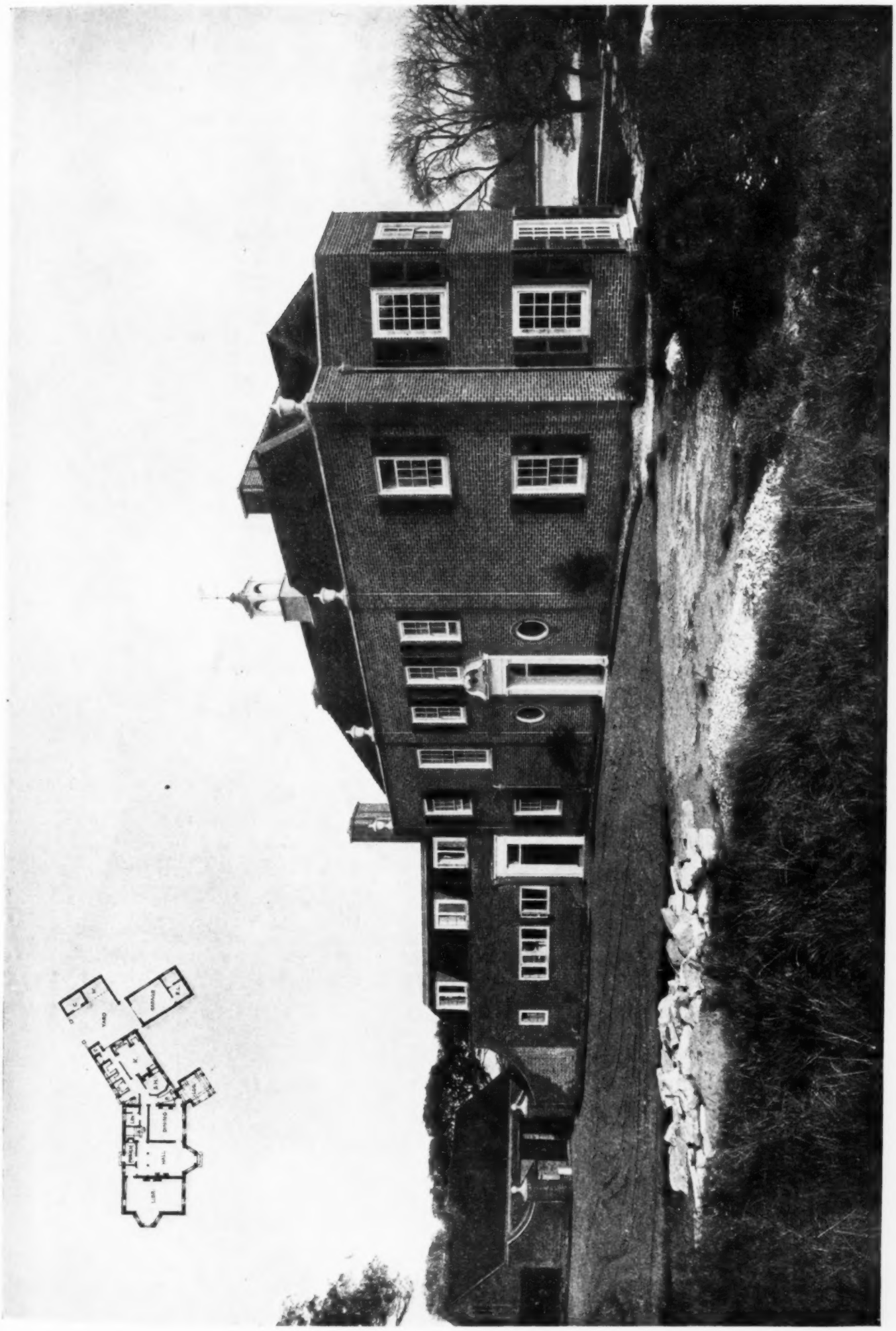

NEW PREMISES FOR MESSRS J. & E. ATKINSON LTD
BURLINGTON GARDENS AND OLD BOND ST.
Elevation to Old Bond St.
Elevation to Burlington Gardens
Section
PRELIMINARY STUDY FOR ELEVATION
BY E. VINCENT HARRIS F.R.I.B.A.
SCALE
WELL HOLE PLAN

New Premises, Burlington Gardens and Old Bond-street, W.

Mr. E. Vincent Harris, F.R.I.B.A., and Mr. L. H. G. Stanbrooke, Joint Architects.

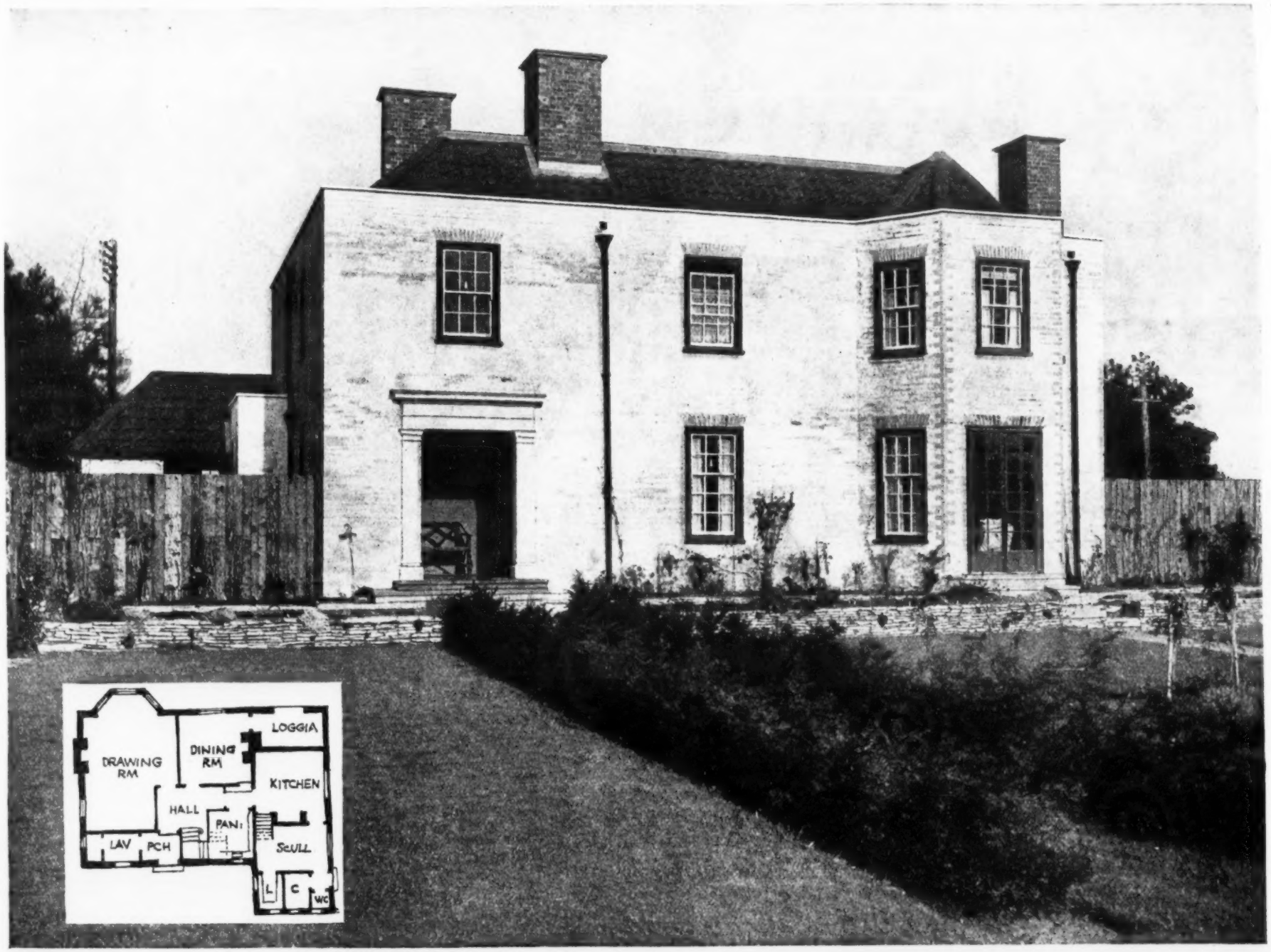
Designed by E. Vincent Harris.

Architectural
Library



House at Hamble, Hants. Messrs. Baillie Scott & Beresford, Architects.

Architectural



House at Mudeford. Messrs. Baillie Scott & Beresford Architects.

Architectural
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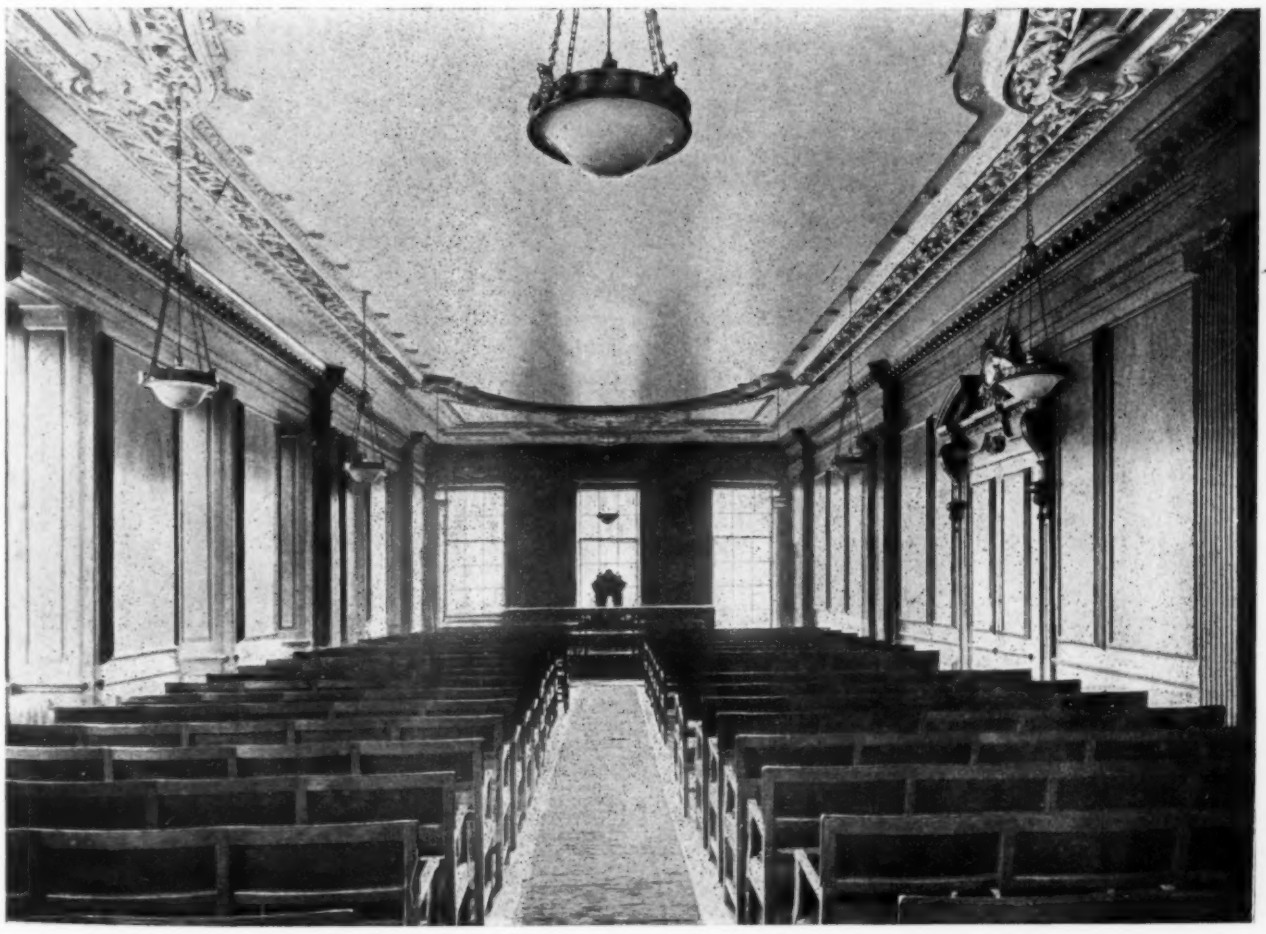
New Headquarters of the Auctioneers' and Estate Agents' Institute.

MESSRS. F. H. GREENAWAY & J. E. NEWBERRY, FF.R.I.B.A., Architects.

Architectural
Library

ENTRANCE HALL.



LECTURE HALL.

New Headquarters of the Auctioneers' and Estate Agents' Institute.

MESSRS. F. H. GREENAWAY & J. E. NEWBERRY, FF.R.I.B.A., Architects.

Architectural
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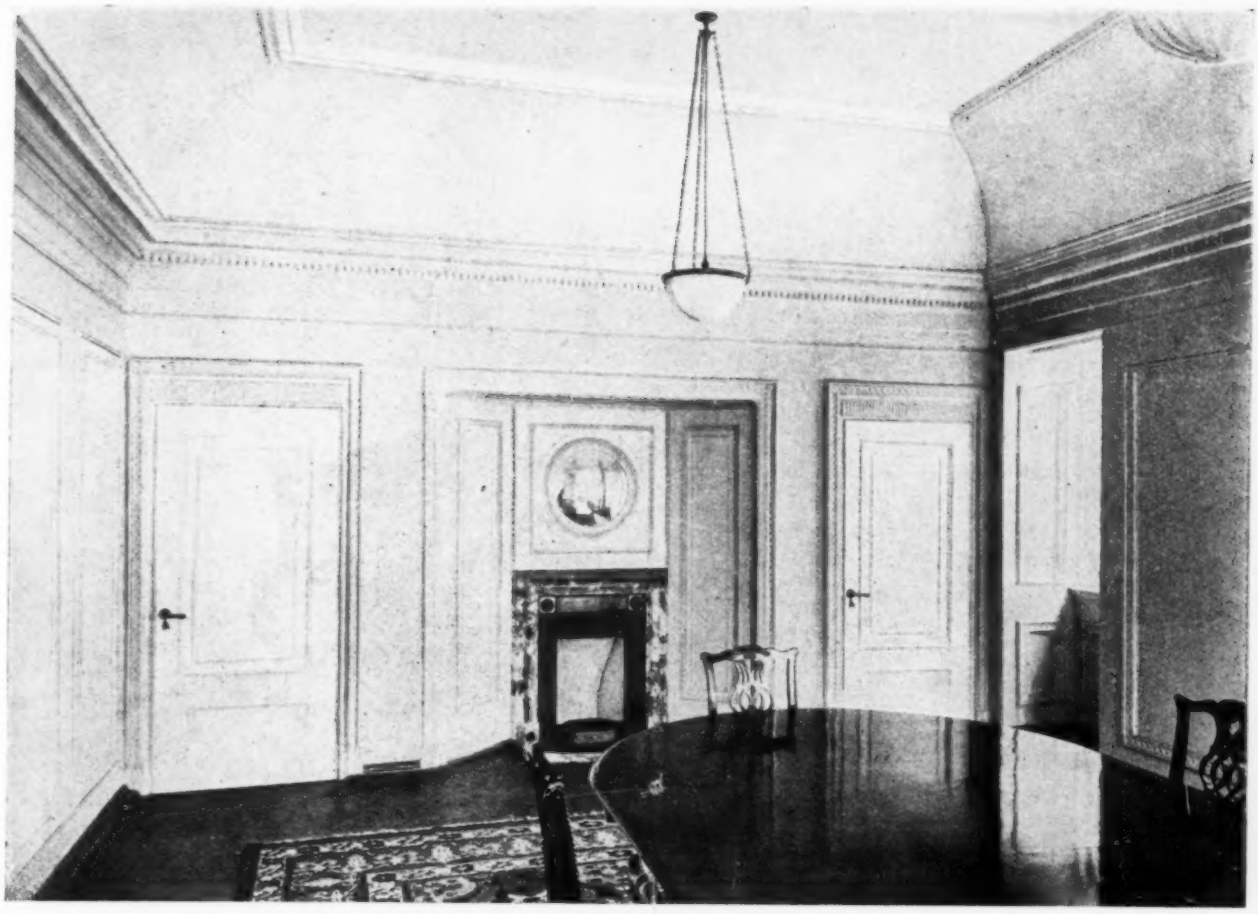

An Interior View.

Council Chamber.

New Headquarters of the Auctioneers' and Estate Agents' Institute.

Messrs. F. H. Greenaway & J. E. Newberry, FF.R.I.B.A., Architects.

Architectural
Library

COMMITTEE ROOM NO. 1.

THE HALL.

New Headquarters of the Auctioneers' and Estate Agents' Institute.

MESSRS. F. H. GREENAWAY & J. E. NEWBERRY, FF.R.I.B.A., Architects.

Lloyd's New Premises: Sketch View from Lime

SIR EDWIN COOPER, F.R.I.B.A.,

from Lime-street and Leadenhall-place.

F.R.I.B.A., Architect.

Supplement to "The Builder" January 9th 1925

SHOWING THE BO
OF THE
SURVEYORS' DISTRICTS UNDE

Brent Park
BRENT
GOLDERS
GOLDERS GREEN
RIVER
ROAD
Cater Lake
Oak
BRENT RESERVOIR
CIRCULAR
NORTH
STREET
KINGSBURY
Clitterhouse Fm.
Cricklewood Aerodrome
DOLLIS HILL
Golf Links
DOLLIS HILL LANE
EDGWARE
CRICKLEWOOD
NEASDEN
GLADSTONE PARK
N.W.
WILLESDEN
WILLESDEN GREEN
HARLESDEN
WORMWOOD SCRUBS
Little Wormwood Scrubs
Ducane Road
WESTERN AVENUE
EAST ACTON
Acton Park
ACTON VALE
SHEPHERDS BUSH
WEST KENSINGTON
BROOK GREEN
HAMMERSMITH
NORTH END
HIGH ROAD
Castelnau
RESERVOIRS
WALHAM
Paddington Cemetery
St Mary's R.C. Cemetery
Gasworks
Isolation Hospital
Sewage Works
Engine Shed
Junction
Lower Pools
Cemetery
Park
Recreation Ground
Tennis Courts
Bowling Green
Bath
Baths
Church
Chapel
Schools
Institute
Hall
Public House
Tram Shed
Tram Depot
Tram Terminus
Post Office
Fire Station
Police Station
Prison
Workhouse
Infirmary
Hospital
Cemetery
Gas Works
Water Works
Reservoir
Pumping Station
Electricity Works
Sub Station
Goods Station
Coal Depot
Timber Yard
Wharf
Dock
Basin
Canal
Lock
Bridge
Ferry
Pier
Landing Stage
Boat House
Boat Yard
Slipway
Lighthouse
Beacon
Buoy
Mooring
Anchorage
Quarantine
Customs
Excise
Harbour Master
Pilot
Lifeboat
Coastguard
Signal Station
Observatory
Meteorological Station
Time Ball
Flagstaff
Monument
Memorial
Statue
Fountain
Drinking Fountain
Clock Tower
Town Hall
Guildhall
Council Offices
Library
Museum
Art Gallery
Theatre
Music Hall
Cinema
Concert Hall
Opera House
Exhibition
Pleasure Ground
Zoological Gardens
Botanical Gardens
Aquarium
Menagerie
Circus
Fair Ground
Roundabout
Switchback
Shooting Gallery
Skittle Alley
Bowling Alley
Billiard Room
Gymnasium
Swimming Bath
Diving Board
Spring Board
Turkish Bath
Vapour Bath
Shower Bath
Douche
Massage
Electric Light
Gas Lamp
Oil Lamp
Candle
Torch
Lantern
Searchlight
Flood Light
Spotlight
Floodlight
Footlight
Chandelier
Sconce
Bracket
Pendant
Reflector
Shade
Globe
Chimney
Flue
Vent
Ventilator
Air Shaft
Skylight
Roof Light
Window
Door
Gate
Fence
Wall
Hedge
Ditch
Moat
Bank
Embankment
Cutting
Tunnel
Viaduct
Arch
Pier
Abutment
Buttress
Column
Pillar
Post
Rail
Handrail
Balustrade
Parapet
Coping
Cornice
Frieze
Architrave
Pediment
Dome
Spire
Tower
Turret
Minaret
Steeple
Belfry
Bell
Clock
Weathercock
Vane
Flagpole
Flag
Banner
Pennant
Standard
Ensign
Jack
Union Jack
Red Ensign
White Ensign
Blue Ensign
Merchant Flag
Signal
Semaphore
Heliograph
Telegraph
Telephone
Wireless
Aerial
Mast
Rigging
Sail
Oar
Rudder
Tiller
Helm
Wheel
Compass
Chart
Log
Lead
Sounding
Depth
Tide
Current
Wave
Swell
Breakwater
Groyne
Jetty
Quay

BOUNDARIES

THE

UNDER THE **BUILDING ACTS**

"THE BUI

COUNTY

E BUILDER" MAP
OF THE
UNTY OF LONDON

L

NAMES AND ADDRES

No.	District	Surveyor	
1	Battersea	BLACK, P. J.	233, Laver
2	Bermondsey	DAUBNEY, C. A.	Bank Cha Hop
3	Bethnal Green	MAYHEW, R. H. J.	311, Camb
4	Camberwell	MARSLAND, E.	32, Cambe
5	Chelsea	SURREY, C. W. (Interim)	22, Buckin
6	City of London, East	TODD, J.	7, Camom
7	City of London, West	TODD, J. (Interim)	
8	Clapham	GRELLIER, W.	188, High- Holb
9	Deptford	GREIG, R.	Bank Cha New
10	Finsbury	CROW, A.	29, Amwel
11	Fulham	ROGERS, W.H.	Broadway Gree
12	Greenwich	FILLARY, A. A.	Borough Gree
13	Hackney	GILL-KNIGHT, J. A.	488-490 Kn
14	Hammersmith	GLASSON, A. H. W.	18, Queen- Ham
15	Hampstead	MUNDELL, J. E.	305, Finch
16	Holborn	PERKINS, W. G.	11, Gray's
17	Islington	LEES, E. W.	407, Hollo
18	Kensington, North	TOLLEY, G. (Interim)	96, Westbo
19	Kensington, South	LEGGE, H. A.	30a, Queen Kens

ESSEX
STAMFORD HILL
LEYTON
MARSH
UPPER CLAPTON
LOW LEYTON MARSH
CLISSOLD PARK
STOKE NEWINGTON
HACKNEY DOWNS
LOWER CLAPTON
HOMERTON
HACKNEY MARSH
HACKNEY
DALSTON
KINGSLAND
WICK ROAD
HACKNEY WICK
VICTORIA PARK
STRATFORD MARSH
STRATFORD
WEST HAM PARK
WEST HAM
BOW
MILE END
WHITECHAPEL
STEPNEY
BROMLEY
LIMEHOUSE
COMMERCIAL RD. E.
POPLAR
EAST INDIA DOCK ROAD
LONDON DOCKS
WEST INDIA DOCKS
MILLWALL DOCKS
CUBITT TOWN
ROTHERHITHE
BERMONDSEY
WALWORTH
EAST GREENWICH
GREENWICH
TRAFALGAR ROAD
VICTORIA
TIDAL BASIN
THAMES
32
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BY

SPECIAL PERMISSION

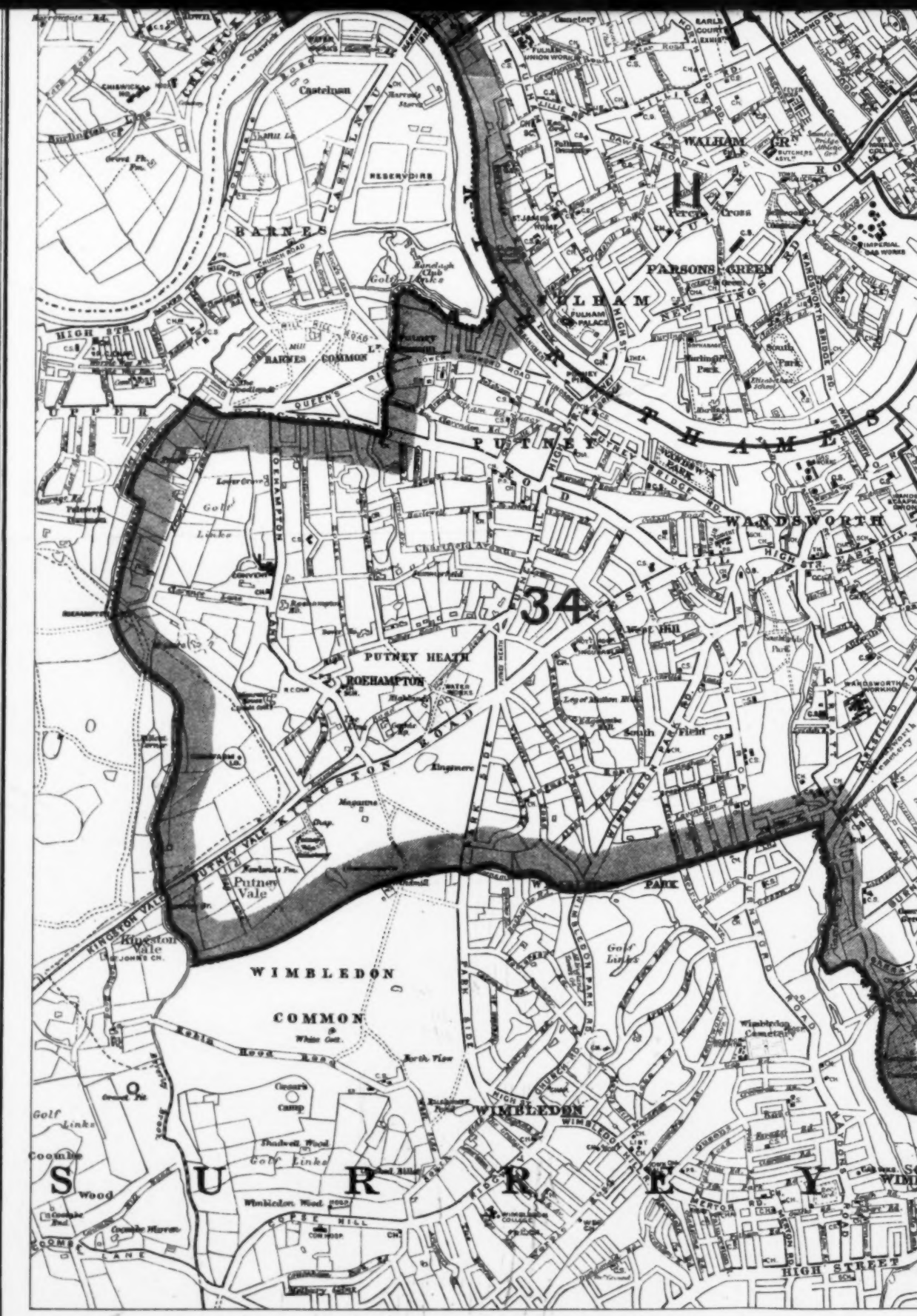
OF THE

LONDON COUNTY COUNCIL

ODRESSES OF DISTRICT SURVEYORS (with Reference Numbers to Map)

	Office	Office Hours
	233, Lavender-hill, S.W. 11. Latchmere 4218	9.30-5 Sat. 9.30-1
	Bank Chambers, Tower Bridge, S.E. 1. Hop 558	do.
	311, Cambridge-rd., E. 2. East 1137	do.
	32, Camberwell-grove, S.E. 5. Brixton 2231	do.
	22, Buckingham-gate, S.W. 1. Victoria 5386	do.
	7, Camomile-st., E.C. 3. Avenue 8711	do.
	188, High-st., Clapham, S.W. 4. Holborn 5523	10-4 Sat. 10-1
	Bank Chambers, 329, New Cross-rd., S.E. 14. New Cross 890	9.30-5 Sat. 9.30-1
	29, Amwell-st., E.C. 1. Clerkenwell 5885	do.
	Broadway House, The Broadway, Walham Green, S.W. 6. Western 2390	do.
	Borough Hall, Royal-hill, S.E. 10. Greenwich 314	do.
	488-490 Kingsland Rd. E.8. Dalston 629	do.
	18, Queen-st., The Broadway, W. 6. Hammersmith 922	do.
	305, Finchley-rd., N.W. 3. Hampstead 8794	do.
	11, Gray's Inn-sq., W.C. 1.	do.
	407, Holloway-road, N. 7. North 1561	do.
	96, Westbourne-grove, W. 2. Park 2799	do.
	39a, Queen's Gate-gardens, S.W. 7. Kensington 1157	do.

No.	District	Surveyor	Office	Office Hours
20	Lambeth, North	COGGIN, C. T.	69, Kennington-oval, S.E. 11.	9.30-5 Sat. 9.30-1
21	Lambeth, South	STOKES, A. P.	365, Norwood-rd., S.E. 27. Streatham 346	do.
22	Lewisham, East	YOUNG, E. A.	155, Rushey-green, Catford, S.E. 6. Lee Green 1507	do.
23	Lewisham, West	VERSTAGE, A. H.	1, Waldram-rd., Forest Hill, S.E. 23. Sydenham 1938	do.
24	Paddington	TOLLEY, G.	96, Westbourne-grove, W. 2. Park 2799	do.
25	Poplar	KNIGHT, E. W.	135, Bow-rd., E. 3. East 6057	do.
26	St. Marylebone	FORD, L. R.	32, Orchard-st., Oxford-st., W. 1. Mayfair 874	do.
27	St. Pancras	MONIER-WILLIAMS, S. F.	43, Grafton-st., Fitzroy-sq., W. 1. Museum 1867	do.
28	Shoreditch	SMITH, R. E.	124, Shoreditch High-st., E. 1. Central 1455	do.
29	Southwark	DICKSEE, B. J.	14 & 16, New Kent-rd., S.E. 1.	do.
30	Stepney, East	KERR, H. N.	1, West Arbour-st., Commercial-rd. East, E.1. East 1109	do.
31	Stepney, West	BROMLEY, H. T.	130, Whitechapel High-st., E. 1. Avenue 7480	do.
32	Stoke Newington	MAYHEW, R. H. J. (Interim)	171, Church-st., N. 16. East 1137	do.
33	Wandsworth, East	MORRICE, A. G.	1, Drewstead-rd., Streatham, S.W. 16. Streatham 1186	do.
34	Wandsworth, West	ELTON, P. I.	Bank Chambers, 85, High-st., Wandsworth, S.W. 18. Latchmere 4537	do.
35	Westminster, East	HILLS, O. C.	60, Haymarket, S.W. 1. Gerrard 4553	do.
36	Westminster, West	HARDCASTLE, W. J.	9, Conduit-st., Regent-st., W. 1. Mayfair 434	do.
37	Westminster, South	SURREY, C. W.	22, Buckingham-gate, S.W. 1. Victoria 5386	do.
38	Woolwich, North	YOUNG, H. H.	21, William-st., S.E. 18. Woolwich 280	do.
39	Woolwich, South	YOUNG, E. A. (Interim)	do. do.	do.



Published by THE BUILDER, LIMITED, at 4 Catherine Street, Aldwych, W.C. 2.

5
20
21
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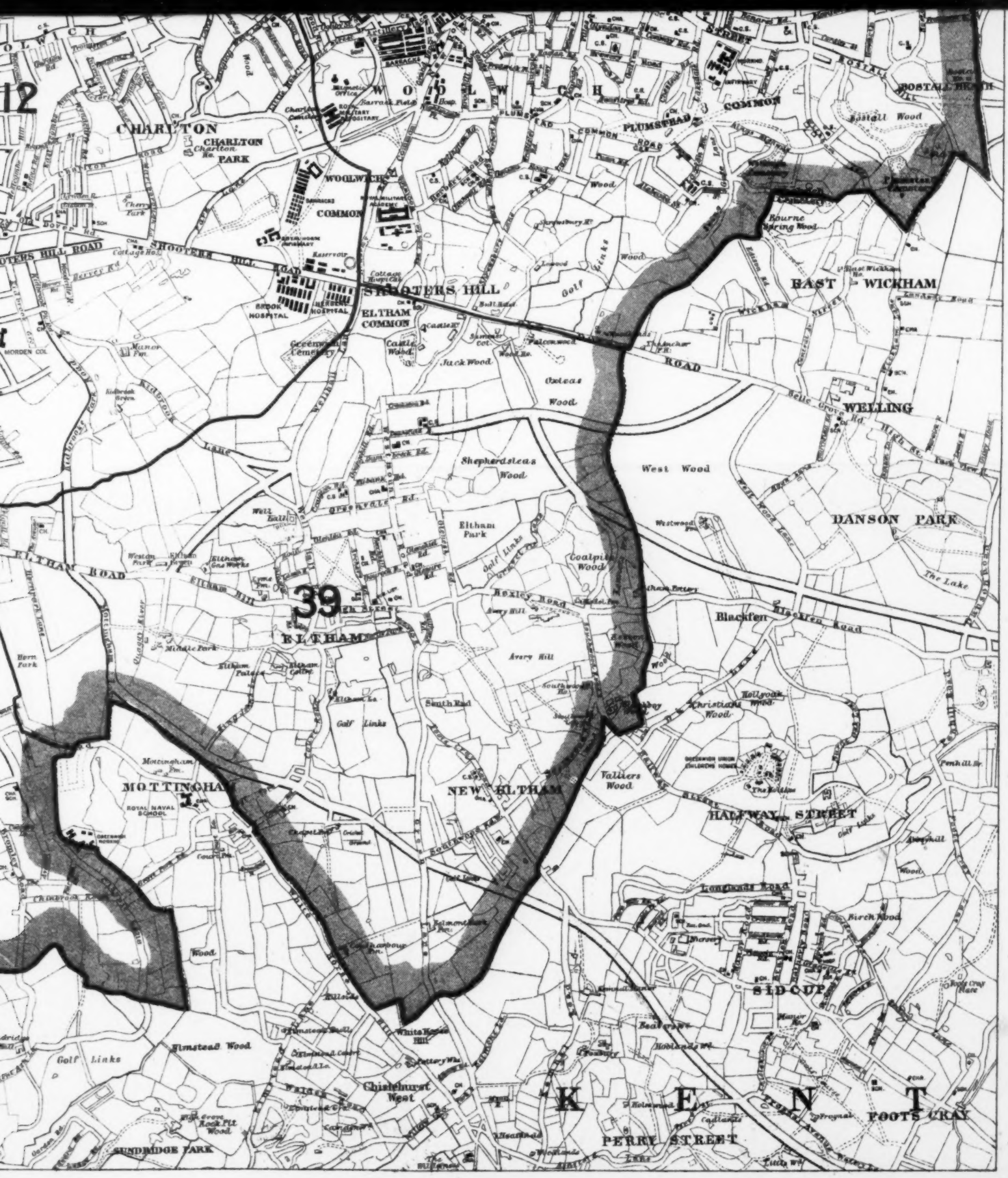
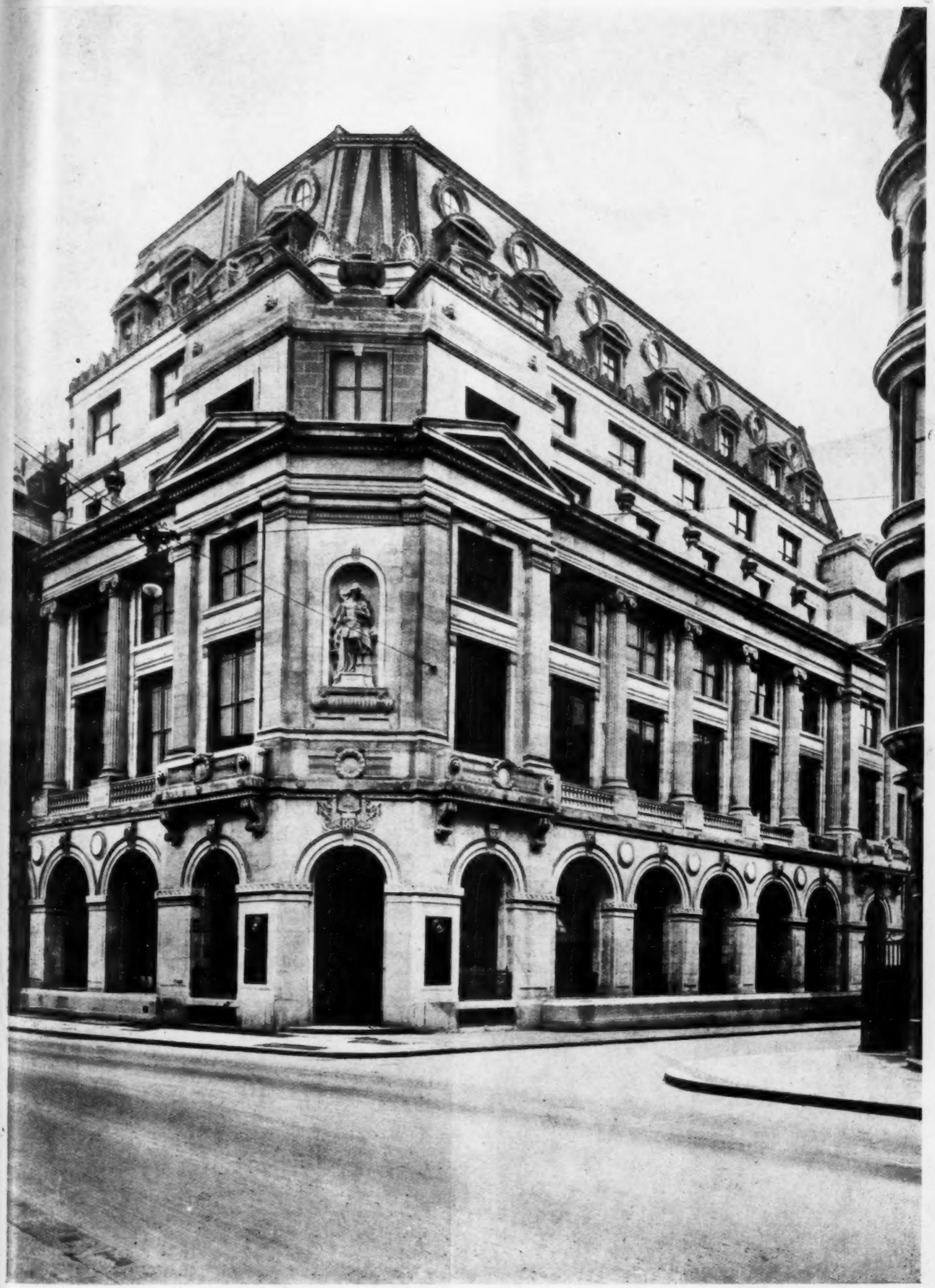
33
CHELSEA EMBANKMENT
BATTERSEA PARK
BATTERSEA
CLAPHAM
CLAPHAM COMMON
Golf Links
BALHAM
KENNINGTON
SOUTH LAMBETH
NORTH BRIXTON
STOCKWELL
WALWORTH
CAMBERWELL
PECKHAM
CHAMPION HILL
HERNE HILL
EAST DULWICH
BROCKWELL PARK
DULWICH
DULWICH COMMON
WEST DULWICH
TOOTING BEC
TOOTING BEC COMMON
UPPER TOOTING
LOWER TOOTING
STREATHAM
LOWER STREATHAM
WEST NORWOOD
NORWOOD NEW TOWN
UPPER NORWOOD
SOUTH WIMBLEDON

WALWORTH
PECKHAM
NEW CROSS
GREENWICH
GREENWICH PARK
BLACKHEATH
LEE
LEWISHAM
CATFORD
DULWICH
EAST DULWICH
PECKHAM RYE
PECKHAM RYE PARK
FOREST HILL
UPPER SYDENHAM
LOWER SYDENHAM
NORWOOD NEW TOWN
UPPER NORWOOD
WEST DULWICH
SOUTH END
LEE GREEN
BLACKHEATH VALE
CHAMPION HILL
DULWICH COMMON
SHOOTERS HILL RD.
TRAFALGAR ROAD
EAST GREENWICH
LEE HIGH ROAD
ALBANY ROAD
QUEEN'S ROAD
HIGH STREET
CRYSTAL PALACE
Golf Links
Sports and Ground
Cemetery
Brockley Hill
Horn Park
Sundridge
12
9
4
23
22



J-182 G. W. Bacon & Co., Ltd., Norwich St. Fetter Lane, E.C.4.



New Premises for P. & O. Steam Navigation Co., Leadenhall-street, E.C.

MR. STANLEY HAMP, F.R.I.B.A. (Messrs. Collcutt & Hamp), Architect.

[Further illustrations of this building were given in our issue for May 16 and December 19, 1924.]

[Rough racking to support relieving arch above stoups. The new rubble core on the right of the photograph does not obliterate the interest of the ancient fragment it supports.]

PHOTO NO. 12.—EAST SIDE, NORTH TRANSEPT.

[Note fracture in clerestory wall, fragment of broken arch, and the ornamented out-corbelled portion of the vault springing.]

PHOTO NO. 9.—SOUTH TRANSEPT ARCADE.

PHOTO NO. 7.—BEFORE REPAIR.

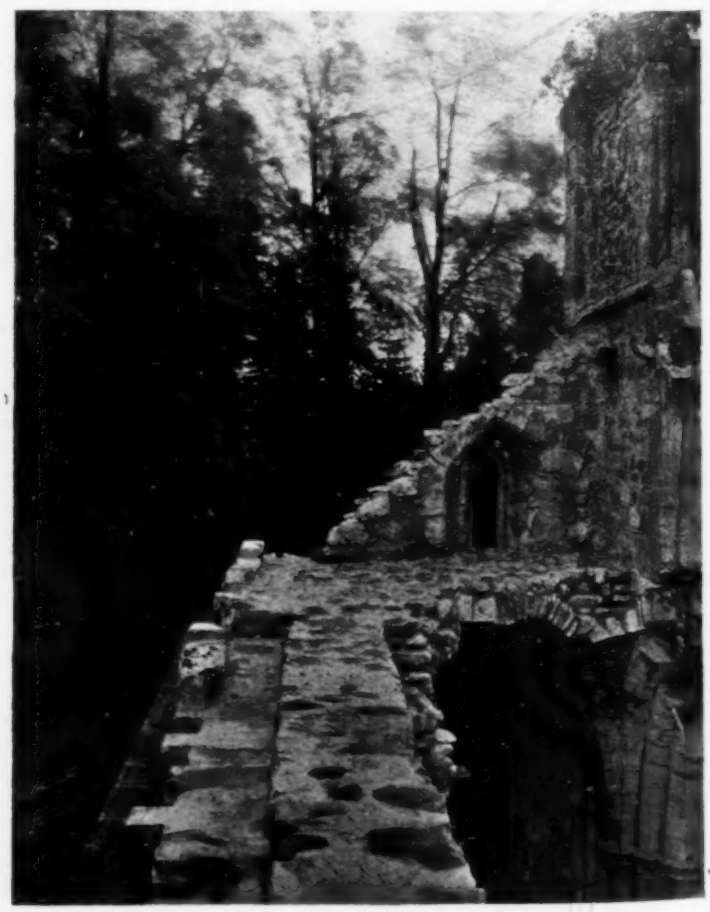


PHOTO NO. 8.—AFTER REPAIR.

[The left-hand view shows the cavity filled in, the metal support, and copper cramps to retain the outer edge of the vaulting.]

Netley Abbey: Vault and Wall Top, North-East Chancel.

NETLEY ABBEY AND ITS CONSERVATION

By WILLIAM HARVEY.

During some 150 years the taste for Gothic architecture has been cultivated in England, but, with the passage of time, the expression of that taste has undergone certain modifications. Interest is still keen as in the days when Fielding discussed the beauties of the Gothic style for domestic buildings or the brothers Adam, in the intervals between building works in the Grecian manner, could carry out Gothic design on the grandest scale, but these experiments themselves have driven interest into a different channel. New mock-mediæval works are no longer in demand, but a very real desire for the preservation of genuine ancient vestiges has taken the place of what now appears to have been a misguided adventure into the by-paths of design. In matters of detail, too, manners have changed considerably. A great writer on mediæval subjects would no longer be applauded for carving his name upon an ancient monument, and a distinguished visitor to that monument would hesitate to repeat the action of the Vicomte d'Arlincourt, who inscribed his name beside that of Sir Walter Scott and recorded the fact together with his sentimentalisings on the occasion in his book of travels, "Les Trois Royaumes," published in 1844.

A more fitting attitude of mind towards the treatment of ancient monuments is manifested in Barham's "Ingoldsby Legends," where the misuse of Netley Abbey precincts, as a place for picnics and skylarking, occasioned the author's reference to the landowner of the period, who permitted such unseemly behaviour—

"No doubt he is a very respectable man,
But—*I can't say much for his taste.*"

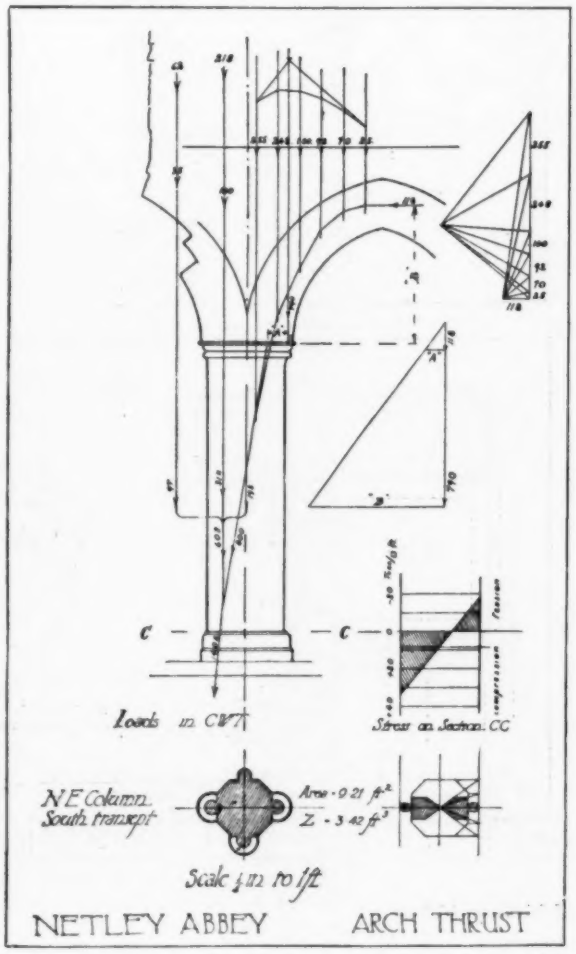
The phrase has been most extensively quoted since its publication in 1837, but, in spite of its popularity as a verbal quip, Barham's protest failed to achieve its purpose until the custody of Netley ruins came within the province of H.M. Office of Works, Historic Buildings Branch.

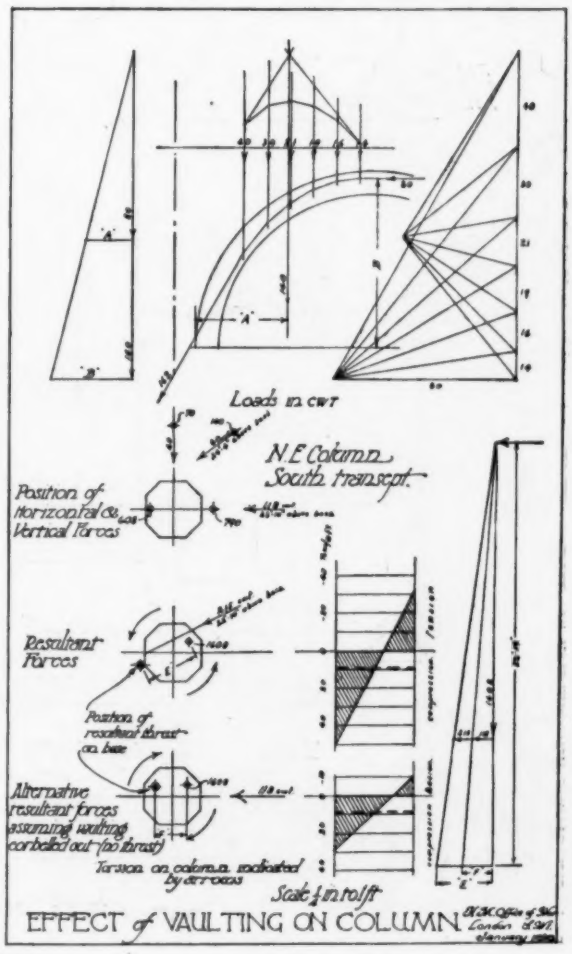
As recently as 1921 Black's Guide Book to Hampshire contained a complaint that the "Imposing and finely situated ruin seems rather desecrated by being made into a place of popular junketings. The garden is vulgarised by swings and such like; teas and other refreshments may be had; and on moonlight nights the revellers are tempted to linger late." The historical and artistic value of the building was also almost completely obliterated and its stability endangered by rank growths of weeds, trees, and ivy rooted on and in the substance of its walls (photos 1 and 2). A difference of opinion exists on the subject of the alleged picturesque character of ivy-clad ruins, but investigation has shown, beyond a doubt, that vegetation is destructive of masonry, and Netley Abbey has suffered severely from this cause. Whole masses of wall had become covered until no stone was visible except such as had been thrown to the ground by the bursting pressure of the roots. The wall tops, in several places, were expanded and overhanging, with their facing stones precariously and temporarily bound together by a slender and insecure network of twigs and fibres. Old and decayed trees growing near the walls were also a source of potential danger, both to the structure and to visitors.

A moment's consideration will show that the proposal to retain foliage upon the surfaces of the old walls must seem a needless aggravation of the conservator's anxieties, and indeed where masonry is overgrown, scientific and inconspicuous methods of repair are impracticable. An ivy-clad ruin may be kept temporarily in position by buttresses or props, but cannot be treated to a scheme of hidden internal consolidation by means of reinforcement and cement grout.

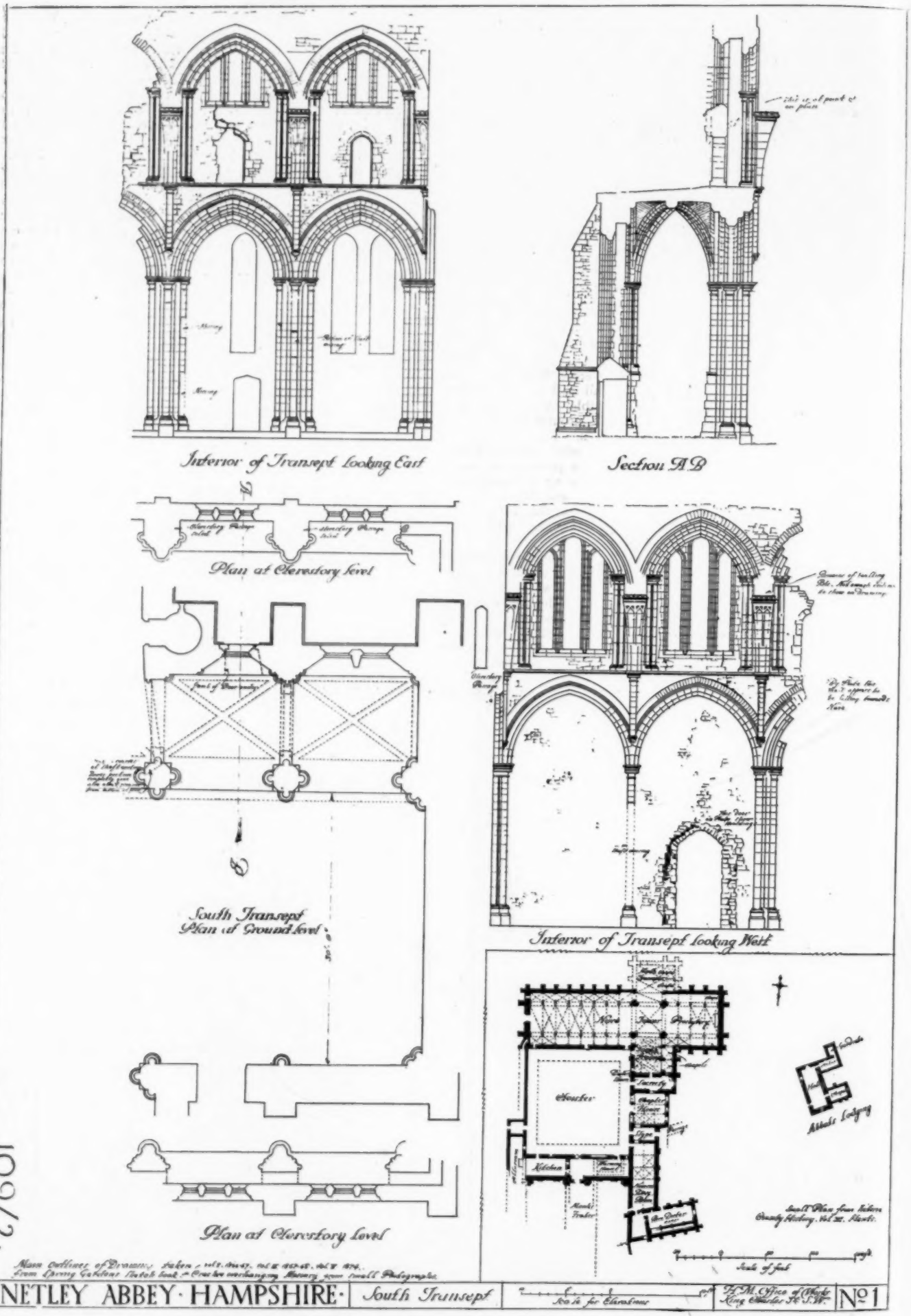
A necessary preliminary to these more intellectual and satisfactory measures of repair is a complete knowledge of the present structural condition of the building, and it would be quite impossible to acquire such information where the masonry itself is hidden and the extent of its defects a mere matter of guesswork. Where all is shattered and out of plumb nothing can be confidently depended upon, and the most careful scrutiny is needed. That this was the case at Netley is exemplified in the state of the N.E. corner of the chancel wall (photographs 3 and 4). The extreme dilapidation had formerly been hidden with dirt and foliage, but photograph No. 3 shows the rough heap of stones after the removal of the heavier masses of vegetation, but before any repair or even complete cleaning had been put in hand. Roots and frost have driven the stones from their beds, the mortar has been washed out by rain, and its place taken by a fine mould composed of decayed vegetable matter and bird droppings. The finished repairs are shown in photograph No. 4. The internal cavities in the work have been thoroughly cleaned out and filled with cement mortar, the ashlar rebedded, and the beautiful corbel table secured from falling. Where masses of the interior rubble core of the building had been washed out with the old mortar, in the course of centuries, and the facing stones had been left without proper solid backing, a little rough racking in rubble has been rebuilt, but does not obtrude itself as a new blot on the old work. Comparison of photographs Nos. 3 and 4 will reveal the fact that even the colour of the lichen stains on the stone surface has been respected, although the utmost care has been taken to clean the interior faces in order that the new cement mortar may adhere to the stones and hold all together.

The colours of the Netley wall surfaces are extremely fine, wherever they are visible, and this careful handling of a point of detail is all the more welcome on that account. Just within this north-east corner of the abbey church a small portion of the aisle vault remained standing as a dangerous overhanging




Loads in CWT
N.E. Column South transept
Position of Horizontal & Vertical Forces
Resultant Forces
Position of resultant thrust on base
Alternative resultant forces assuming walling corbelled out (no thrust)
Torsion on column induced by arrows
Scale ¼ in to 1ft
EFFECT of VAULTING ON COLUMN

DRAWING NO. 2



DRAWING NO. 1.—Repair of Netley Abbey.

PHOTO NO 3.—BEFORE REPAIR.

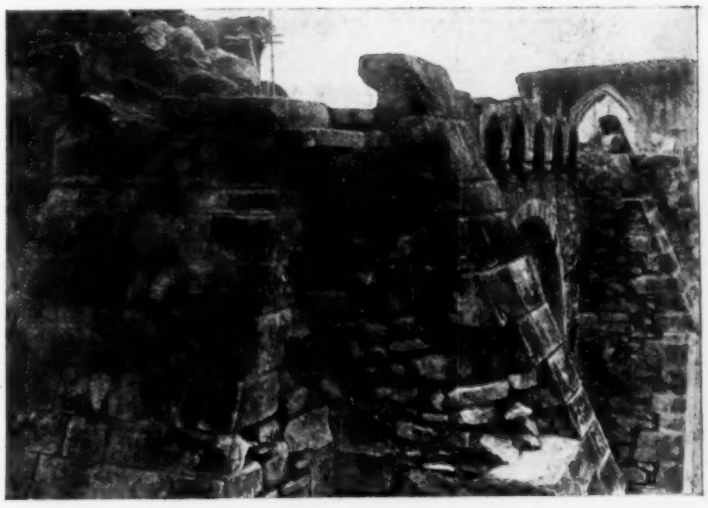


PHOTO NO. 4.—AFTER REPAIR.

[The original ashlar stones have been set back to their correct positions, the table course lifted and set vertically, and the large cavities in the tops of the buttresses filled in with rough masonry of a character similar to that in the Abbey ruins.]

Netley Abbey: Exterior of North Wall of Church.

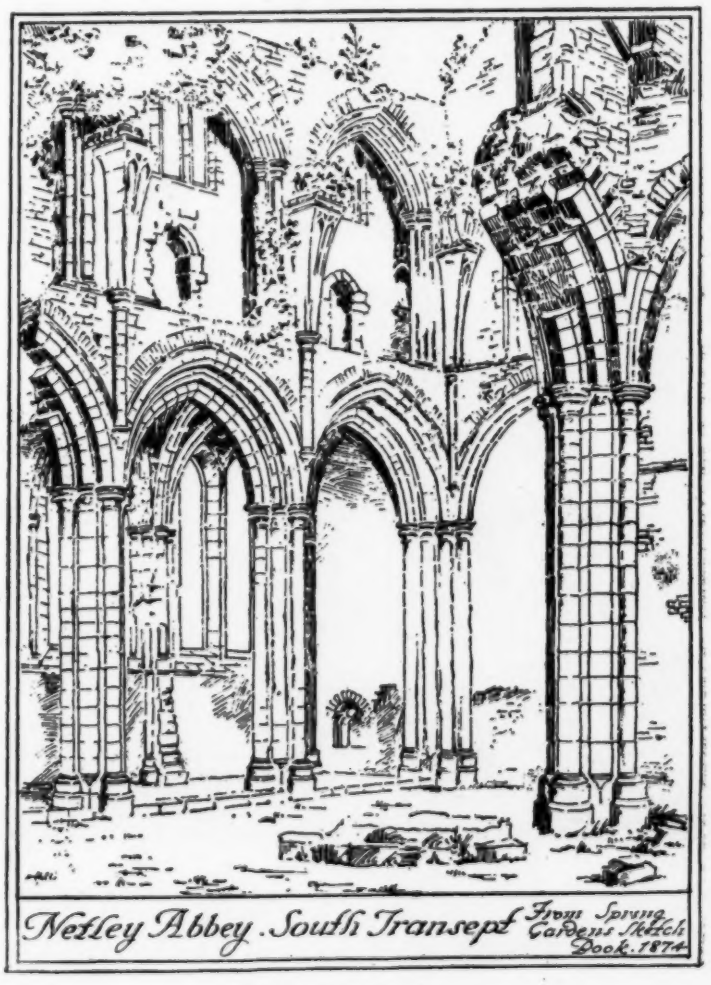
mass (photographs 5 and 6). The ribs had gone and the shell of rubble stones and mortar was pierced by a large hole (photograph 6). Ragged edges were presented to the church as stone after stone dropped away, but even this picturesque feature of the building is a record of history and of constructional method and as such was respected. The foliage, roots, and débris that had accumulated above the vault were cleared away and the joints between the voussoirs cleaned out after a timber centre had been erected to support the load. To prevent movement in future in the exposed stones at the edge of the vault they were tied back with copper cramps to a reinforcing bar of delta metal placed out of sight upon the top of the vault and some little distance back from the broken edge (photograph No. 7). Every bad joint was raked out, cleaned and tamped full of cement mortar. The cavity in the fragment of vaulting was filled in as it menaced the safety of the other portions, and a pavement was formed above the haunch and crown of the vault with rubble, stones and cement. This pavement was laid to fall towards the old line of gutter slabs on the aisle wall top, and rain water will find its way out of the old stone spout overhanging the corner of the building. The pavement also serves to hide and to protect the reinforcing bars and keeps them solidly embedded in a united mass of material (photograph No. 8).

The more important and hazardous movements of the north-east pier of the south transept received treatment on somewhat similar lines, though the larger quantity of material involved demanded a careful analysis of pressures. The drawings Nos. 1, 2 and 3 show how the pier and the mass of masonry supported by it have tended to part company with the remainder of the work on the south side of it. They also demonstrate the importance of arresting the movement which has caused the extensive fracture above the arch. Beside the eccentric load applied by the broken fragments of arch and vault springers, the pier is subjected to the thrust of a vault at aisle level, and was found to be in a state of unstable equilibrium owing to the fall of the piers of the central tower which originally buttressed the thrusts of the arches and aisle vaults. The theoretical determination of the state of equipoise in the pier amply accounts for the fissure in the masonry and clearly points to the necessity of definite measures for controlling the thrusts of the arches and vault. Such measures might have taken the form of shores or buttresses to be built in the church on the northern side of the pier, or of tie-bars across the spans of the arcade arches to communicate the thrust to anchor-bars in the south wall of the transept and its north aisle wall.

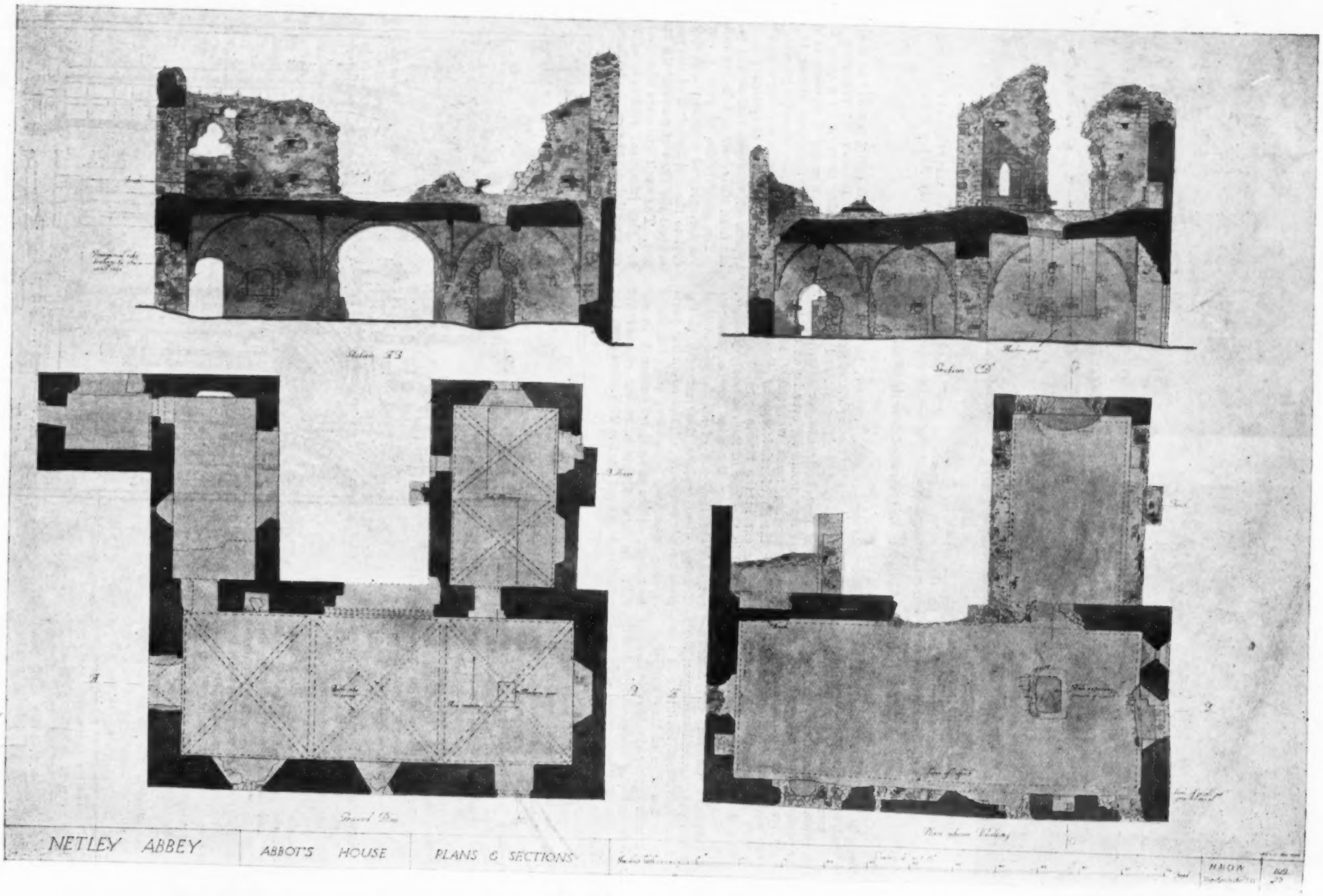
Such measures would, however, be repugnant to the principle of complete conservation with the least possible alteration, and instead of building new buttresses, or inserting tie-bars where they would for ever be an offence, the overhanging mass was safely anchored back by means of reinforcement disposed in trenches cut in the rubble core in the wall top and in the floor of the clerestory passage.

Beside keeping the new tensile members out of sight (and out of mind) this method of using them exploits their strength to the greatest advantage of all the adjoining parts of the shattered structure, and facilitates treatment of the dilapidated masonry in detail. As has been seen in the case of the vaulting fragment in the N.E. corner of the church, it is easily possible to hold individual stones in position by cramping them back and hooking them on to a main line of reinforcement whereas a system of buttressing would leave individual stones to be treated in detail by some separate process. Wherever arches or vaults have fallen throughout Netley Abbey a fragment of springing is left with its uppermost voussoirs just on the point of sliding from their beds and falling to the ground.

The preservation of even a few stones at the springing of a broken arch means a great deal to the artistic effect of the ruin, for they suggest the lines of parts of the building now lost. The vault springers of a Gothic building are also important evidences of the state of constructional science at different periods.



DRAWING NO. 3.



DRAWING No. 4.—**Netley Abbey.**

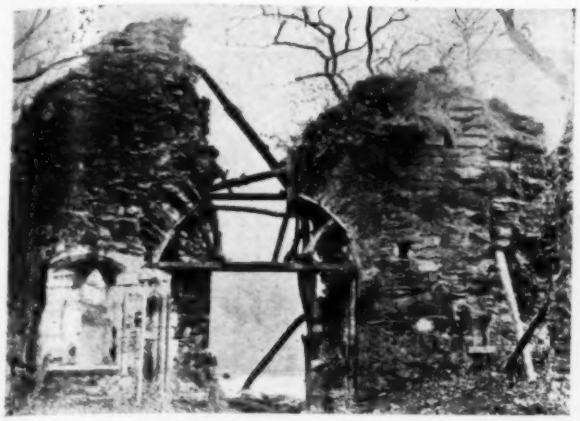


PHOTO NO. 10.— NORTH ELEVATION OF SOUTH END OF ABBOT'S HOUSE, OR INFIRMARY, BEFORE REPAIR.

PHOTO NO. 11.—WEST SIDE OF ABBOT'S HOUSE, OR INFIRMARY, BEFORE REPAIR.
[The walls are pressed out of the vertical by the vaulting within.]

As the principles of arched building were developed the opportunity to control the arched thrusts upon a series of corbels was seized upon, and in the south transept at Netley the vault springers are particularly interesting on account of the introduction of ornamental emphasis at the top of the jas-de-charge or out-corbelled portion of the vault (drawings 1 and 3, photo 9). The adaptation of an old springing belonging to the original building founded in 1239 should be noticed; the upper courses of the corbel and the battlemented slab belong to a much later period, for it was only when the laws of structure became more fully understood that the transformation of lateral pressures by means of the corbel was advertised by special artistic features. The change in ornamental detail also betrays the later insertion.

Compared with several other ruined abbeys, Netley is fortunate in preserving many fragments of vaulting of sufficient size to maintain some sense of enclosure in the various ruined chambers. Several of these vaults are, however, in a most dangerous condition both in respect to general movements due to defective equipoise in the vault and its abutments and in the falling of stones and mortar washed away piecemeal by the rain or pushed down by the roots of trees.

The building known as the abbot's lodging or infirmary has its lower story ceiled with cross-groined vaults of rubble masonry provided with wall, transverse and diagonal ribs. The arches are much depressed at their crowns and have certainly altered greatly in shape through decay since the time of the dissolution. The outer walls of the building are not thick in proportion to the vault spans and the original builders probably counted upon the weight of the walls of the upper story as an essential part of their scheme of equilibration. This was a sound structural proposition just so long as the upper walls remained intact and vertical and received additional stability from the weight of the roof. But as soon as the walls began to lean outwards the conditions of stability were very adversely affected. At the present time, after centuries of neglect, the walls have attained such an extraordinary outward inclination as to be themselves a source of danger and a cause of further movement.

Far from being useful balance weights directing the vault thrusts into safer and more nearly vertical courses they now exhibit a tendency to overturn of themselves and would do so in time under the application of their own eccentrically applied weight apart from any lateral pressures conveyed to them by the vaults. Until the vault tops were relieved recently of some of their load of débris, the pressures must have been altogether excessive. Piles of fallen stones, sand, leaf mould and growing plants and trees were burdening the floor, which sags visibly towards the centre of the span (drawing 4 and photos 10 and 11)). The concentration of rain water upon the crown of the vault naturally carried away the mortar from between the rubble voussoirs as it oozed down into the chamber below. Loss of mortar was followed by further depression of the arches with increasing pressure upon the outward leaning walls. Parts of the vaults fell and a square pier was built by some former custodian of the ruins in one bay of the vaulting to prevent further movement. It would be interesting to learn the origin of this unsightly structural expedient which cannot, however, be called extraordinary. Architects and engineers have inserted piers under the crowns of vaulting by way of repairing ancient buildings up and down the country, and the practice has acquired a weight of respectability through precedent that would not be accorded to it on its merits. In sober fact, a pier rising to support an arch in the middle of its span is a most miserable piece of work. Structurally considered, it entails a confusion of ideas, and from an artistic point of view it spoils not only the sweeping curve of the arch but also the fair proportion of solid to void, introducing a mass of light material where dark shade should be or *vice versa*. For all its inefficiency and ugliness it is not inexpensive; its foundations must be taken down to a hard bottom, and the work carried out slowly and carefully or it will shrink away from the arch it is supposed to support. The actual vaults in the abbot's house at Netley are now temporarily supported on wooden centres, and the overhanging side walls are kept shored up until the work can be thoroughly examined, the pressures calculated, and the best method of inconspicuous repair determined. Excavations have revealed that the original foundations of some parts of the wall were quite inadequate and were not carried down to a firm bottom, and these will be carefully underpinned.

In connection with the sagging vaults, the processes of repair adopted in securing the fragment of vaulting in the N.E. corner of the church may be taken as a model, but in the case of the abbot's house vaults the reinforcement needed to support the drooping voussoirs will be combined with anchor-plates in the outward leaning walls to restrain their further movement towards collapse, and some means will doubtless be found for discharging rainwater otherwise than through the substance of the vault.

The photographs showing parts that have already been treated give some idea of the sympathetic nature of the repairs, particularly in the matter of pointing.

The methods of H.M. Office of Works differ from those of earlier restorers in that internal consolidation is depended upon wherever possible. Grouting of internal cavities is accompanied by thorough tamping of cement into the joints and the final pointing is given an old-world appearance in harmony with the weatherworn surroundings. Photograph No. 12 shows how little such measures interfere with the picturesque character of the ruin.

PHOTO NO. 6.—Showing cavity in vault top after removal of soil and debris. Fragment supported and cleaned.

Netley Abbey: Vault Top of North-East Chancel.

Cafe Royal, Regent-street. MESSRS. HENRY TANNER, Architects;
Façade by SIR REGINALD BLOMFIELD, R.A.

"Buckingham House," Buckingham-street, Strand.
MESSRS. TAPERELL & HAASE, Architects.

New Buildings Recently Completed in London.

Messrs. Taperell & Haase, Architects,

Automobile Association, Leicester-square.]
Mr. Andrew Mather, Architect.

"Capitol" Cinema, Haymarket.
Mr. Andrew Mather, Architect.

Café Royal, Regent-street.
Messrs. Henry Tanner, Architects.
Façades by Sir Reginald Blomfield, R.A.

Some Buildings now nearing Completion in London.

GENERAL NEWS

Professional Announcements.

Mr. George Hollins, A.R.I.B.A., M.S.A., architect and surveyor, Lloyds Bank Chambers, Newcastle, has taken into partnership Mr. Reginald Lucas Jones, and the title of the firm will now be George Hollins, A.R.I.B.A., M.S.A., and Reginald Lucas Jones, architects and surveyors, Lloyds Bank Chambers, Newcastle, Staffs.

Mr. George P. Allen, F.R.I.B.A., has removed his offices from 79 High-street, Bedford, to No. 81, High-street, Bedford. Telephone No. 347.

Mr. Graham R. Dawbarn, M.A., A.R.I.B.A., has opened an office at 1, Montague-street, W.C.1.

Mr. H. W. Woodcock has taken over the Quantity Surveying practice of Mr. H. M. Messenger, and will continue the same from 124, Belgrave-road, Victoria, S.W.1 Telephone No.: Victoria 8527. Mr. Messenger intends to continue his attendance at the office, and can be consulted by appointment.

Architects' Benevolent Society.

In view of the interest shown by architects in the scheme of insurance, the Council of the Architects' Benevolent Society has recently secured the help of an advisory committee of insurance experts. The Architects' Benevolent Society is now in a position to answer inquiries on every class of insurance business, whether concerning existing or contemplated policies, and is ready to give considered advice upon all such questions.

St. Paul's Cathedral.

A "Danger Structure" notice has, we understand, been served, on behalf of the City Corporation, on the Dean and Chapter of St. Paul's. The Dangerous Structure Surveyor for the City, Mr. Todd, in his report of December 23 to the Corporation, differed, it is understood, from the interim statement of the Expert Committee of five, hence the notice.

New London Theatre.

A new London theatre is to be built in the vicinity of Shaftesbury-avenue. The new building will cost approximately £120,000, and will have a seating capacity equal to that of any of the existing theatres of London. The plans are in the course of preparation, and it is hoped that the work of construction will be commenced shortly.

Waterloo Bridge Rebuilding.

The Wandsworth Borough Council at a recent meeting stated they had considered the letter, dated October 9, from the Association of Master Lightermen and Barge Owners, requesting the Council to support representations which the Association has made to the London County Council, to the effect that to secure safe navigation of the River Thames through Waterloo Bridge if the bridge is widened, it will be necessary for the span of each, or at least some, of the arches to be practically doubled, and that the new bridge should have not more than five arches. The Association suggests that the matter should be considered by the Borough Council in view of the possibility of interference with the work of the disposal of refuse. The Borough Council recommend that the London County Council be informed that they desire to support the representations made to them by the Association in the matter.

St. Bartholomew's Church, Brighton.

The congregation of St. Bartholomew's, Brighton, acting on the advice of Sir Giles Gilbert Scott with regard to the building of an apse at the church, have issued an appeal for £20,000 to enable the work to be completed.

New Magistrate.

The Lord Chancellor has added the name of Mr. E. J. Strange, of Messrs. Strange & Sons, Ltd., the well-known Kentish builders, to those composing the Bench of Magistrates for the Borough of Tunbridge Wells.

Non-parlour Houses.

The Birkenhead Corporation recently recommended the acceptance of a tender of £52,253 for the erection of 111 non-parlour houses at Rock Ferry.

CORRESPONDENCE

The Late Sir William Emerson.

SIR,—The appreciative and entirely admirable obituary by Professor Beresford Pite concerning our valued and distinguished friend, in last week's issue of *The Builder*, omits to mention Sir William Emerson's estimable services to the profession during his Presidentship of the Royal Architectural Museum in 1902.

Sir Gilbert Scott and Professor Ruskin were the founders. The Right Hon. A. J. B. Beresford Hope, M.P., the Bishop of Ely, Lord Alwyn Compton, D.D., and the late Duke of Westminster did much beyond praise as Presidents; but the first architect chosen for that distinction was Sir William Emerson. This fortunate circumstance proved most opportune, when I had the privilege, as Hon. Secretary, of suggesting the gift of our buildings and their unique contents to the Architectural Association, then quartered in very cramped premises in Great Marlborough-street. Without the President's willing and generous co-operation it would have been impossible to carry out that drastic transfer. Sir William immediately acquiesced, realising as he did the advantage of this scheme for securing adequate premises in which to inaugurate on a firm basis a more systematic system of professional training for the profession in the Metropolis. Moreover, he also understood the situation towards which the Museum and School of Art were drifting, in consequence of the increasing dominant powers of the London County Council's co-optive representatives. No one could have worked more helpfully in this affair, and I enjoyed his entire confidence throughout. In this regard, may I hark back for a moment to the late 'sixties, soon after Emerson's return from India, when I worked in his office, No. 1, Westminster Chambers, prior to his going into the Broad-sanctuary. It happened that my master, Horatio Nelson Goulty, of Brighton, suddenly died, my articles remaining unexpired. Goulty's partner, and still my friend, Mr. John George Gibbins (who had been a fellow pupil with Emerson in the Bloomsbury-square, at Habershon & Pite's office), offered to set me free and introduce me to his intimate friend, Emerson. Thus our association began, and I retained his personal acquaintance till he retired, going from Waterloo-place to reside in the Isle of Wight. Sir William built several houses on his Chiswick property near Grove Park, including "Sutton Court" for his own occupation. We thus, for a while, were neighbours. Few remain who knew Sir William Emerson so long, and I can confirm what Professor Beresford Pite has so ably written about our eminent past President.

Bedford Park, W. MAURICE B. ADAMS.

Some Bricklaying Records.

SIR,—A few days ago in the presence of two surveyors, an architect, and two members of the local Rural District Council, at Ebley, near Stroud (Glos), a bricklayer of Stroud set out to see how many bricks he could lay in an hour. He picked up the bricks and applied his own mortar, and at the end of the 60 minutes he had laid 570 bricks. This quick bricklaying event was easily beaten on December 27 ult., at Scarborough, Yorkshire, by a foreman bricklayer, who laid 879 bricks by three courses of a 9 in. wall, which beat the previous bricklaying record of 809 bricks an hour held by a Mr. C. Hill, of Rotherham. Did the latter two mentioned bricklayers pick up their bricks and apply their own mortar, as in the first-mentioned instance?

HERBERT BURROWS.

Proposed Reconstruction of New Oxford-street.

SIR,—The designs published in *The Builder* for January 2, showing the proposed reconstruction of New Oxford-street, are the work of Mr. Connell, a student of University College Atelier, and should not have been published under my name.

The programme for the subject was suggested by me, and six sets of drawings were worked out by the competitors. The jury awarded the first place to Mr. Connell. I shall be glad if you will correct the impression that I had anything to do with the finished drawings. Mr. Connell alone should receive credit for his fine design.

A. E. RICHARDSON.

(Other letters are unavoidably held over.)

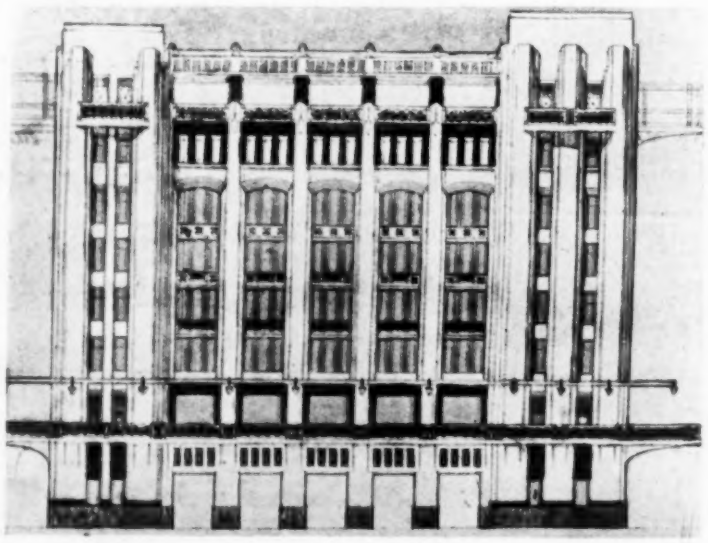
COMPETITION NEWS

New Offices, Nairobi.

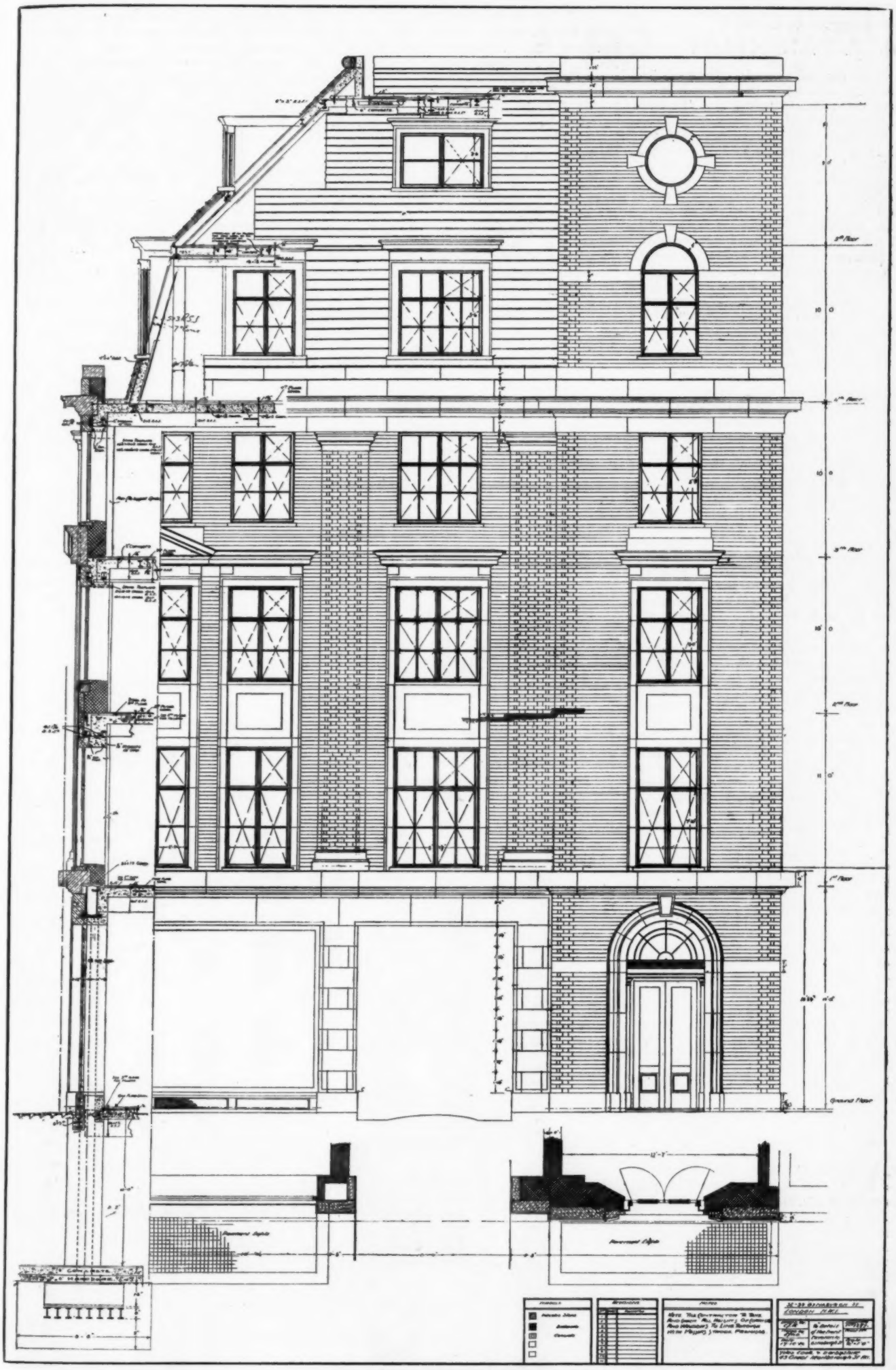
Designs are invited for new railway offices to be erected in Nairobi, Kenya Colony. Premiums of £200 and £100 are offered respectively. Conditions, on the payment of one guinea, from the Crown Agents for the Colonies, Millbank. Sending-in day at the offices of the railway, Nairobi, extended to March 28, 1925. (See our issue for November 7.)

Other Competitions.

Other competitions still open include the following (the dates given are, first the sending in date, and second the issue of *The Builder* in which full particulars were given):—Masonic Hall (May 1). Manchester Art Gallery (Feb. 28; Aug. 22). Industrial Designs (June 25; Dec. 26). Constantine College (May 15; Dec. 19). Valetta Lay-out (June 30; Jan. 2) Argentine Institute (Dec. 31; Jan. 2).



Proposed Reconstruction of New Oxford-street with Three Tiers of Shops.
Design by MR. A. W. CONNELL.



New Premises, Osnaburgh Street, N.W.1.

Messrs. YATES, COOK & DARBYSHIRE, Architects.

THE WORKS OF J. F. BENTLEY

THOSE who know and appreciate the qualities of Gothic architecture, and especially of English Gothic, will never fail to regret that the late J. F. Bentley had to follow the desire of the Cardinal and build the Westminster Catholic Cathedral in a style foreign to this country. It must have been something of a trial to Bentley, for he was one of a select few in whom the instinct and tradition of English Gothic lived as truly as it ever did in the Middle Ages. Fine as the Westminster Cathedral is, we feel sure that a Gothic building by Bentley would have far transcended it in its vital architectural appeal. The monograph of this distinguished architect, which has just appeared from the publishers (Ernest Benn, Ltd.), in their "Masters of Architecture" series, would convey little idea of the beauty and charm of detail to one who knew nothing of the executed work. The first place in the volume is given to the Church of the Holy Rood, Watford, which is, in truth, as perfect and delightful as anything Bentley did. We give one illustration (see p. 41), from some in our possession, which was drawn on the spot before the rood and altar rails were finally completed, but it will suffice to indicate, though it is only a sketch, something of the charm of proportion and detail which, with the admirable tone and colour in the building itself, make up a result which is amongst the very best examples of modern church architecture in England. We really prefer to dwell on work like this and certain almost unknown examples of such a kind in Essex and elsewhere, as the expression of his genius rather than in Bentley's great Cathedral Church. Mr. W. W. Scott-Moncrieff, who writes the book referred to, rightly calls Bentley one of those practical idealists of whom the nation might be proud. He also explains with much emphasis the difficult times and conditions under which the architect lived, so that in the carving and ornaments of the Westminster Cathedral there is a lack of character—a certain want of play and freedom. It is "tight," mechanical, even too well done. But, as for the building itself, "it is not a box of tricks." It is no jumble of steel stanchions and compound girders covered with fibrous plaster slabs and stupid meaningless ornaments. Its bones have real marrow and substance. Here is no pretty mask covering an ugly face.

THE R.I.B.A.

Memorial Service : Mr. Paul Waterhouse.

A MEMORIAL service for the late Paul Waterhouse was held at St. George's, Hanover-square, on Monday last. The following were present :—

Mr. P. H. Adams, Mr. M. B. Adams, Mr. Louis Ambler, Mr. W. H. Atkin-Berry, Mr. H. V. Ashley, Mr. Herbert Baker, A.R.A., Mr. R. W. Baxter, Mr. A. Berkshire, Sir Reginald Blomfield, Mr. T. A. Darcy Braddell, Mr. A. Burnett Brown, Mr. A. E. Bullock, Mr. Walter Cave, Mr. and Mrs. George Carter, Mr. Max Clarke, Mr. M. O. Collins, Mr. O. H. Collins, Mr. Heaton Comyn, Mr. R. E. Crossland, Major H. C. Corlette (representing the Federal Council of the Australian Institutes of Architects), Mr. L. A. Culliford, Mr. H. Cubitt, Mr. H. W. Currey, Mrs. Crowder.

Mr. T. B. Daniel, Mr. W. R. Davidge, Mr. E. Guy Dawber, Mr. Rudolf Dircks, Mr. P. J. Fay, Mr. Horace Field, Mr. and Mrs. H. M. Fletcher, Mr. E. Gabriel, Mr. J. S. Gibson, Mr. F. T. W. Goldsmith, Mr. W. Curtis Green, Mr. Gordon, Mr. J. A. Gotch, P.R.I.B.A., Mr. H. Austen Hall, Mr. S. Hamp, Mr. E. Vincent Harris, Mr. W. H. Harrison, Dr. Haynes, Mr. E. J. Haynes, Mr. E. Hewetson, Mr. G. Hornblower, Mr. G. Hubbard, Mr. and Mrs. W. G. Hunt, Mr. G. Jenkins, Mr. H. V. Lanchester, Mr. G. C. Lawrence, Mr. F. Lishman, Mr. H. Lovegrove, Mr. H. C. Macfarlane, the Hon. Archibald McGarel-Hogg, Mr. H. E. Mathews, Mr. A. A. Messer, Mr. G. A. T. Middleton, Mr. E. Arden Minty, Mr. E. C. P. Monson.

Mr. J. R. Moore-Smith, Mr. F. Winton Newman, Mr. D. Barclay Niven, Mr. G. Northover, Mr. H. Oakley, Mr. F. Osler, Mr. H. L. Paterson, Mr. G. Pinkerton, Mr. W. A. Pite, Mr. E. Turner Powell, Mr. A. N. Prentice, Mr. D. S. Prosser, Mr. W. E. Riley, Mr. Ll. Roberts, Mr. H. S. Rogers, Mr. and Mrs. H. Ryan-Tenison, Mr. E. J. Sadgrove, Lord Stanmore (representing St. Bartholomew's Hospital), Mr. H. D. Searles-Wood, Mr. W. H. Seth Smith, Sir Giles Gilbert Scott, Mr. H. Shepherd, Mr. W. B. Simpson, Mr. J Arthur Smith (representing the Hampshire and Isle of Wight Architectural Association), Professor R. Elsey Smith, Mr. H. T. Sugden.

Sir Henry Tanner, Mr. W. J. Tapper, Mr. S. J. Tatchell, Sir A. Brumwell Thomas, Mr. E. P. Thompson, Mr. F. W. Troup, Mr. F. T. Verity, Professor Wagstaff (representing the Royal Society of Literature), Mr. Edmund Walters (representing Mr. Detmar Blow), Mr. E. P. Warren, Mr. and Mrs. Michael Waterhouse, Mr. W. E. Watson, Mr. Maurice E. Webb, Mr. Herbert A. Welch, Mr. Roland Welch, Mr. W. Henry White, Mr. H. W. Wills, Mr. W. J. Wilsdon, Mr. Edmund Wimperis, Mr. Frank Windsor, Mr. Wm. Woodward, Mr. Frank Woodward, Mr. T. C. Yates, Mr. Clyde Young, and Mr. Keith Young.

Town Planning.

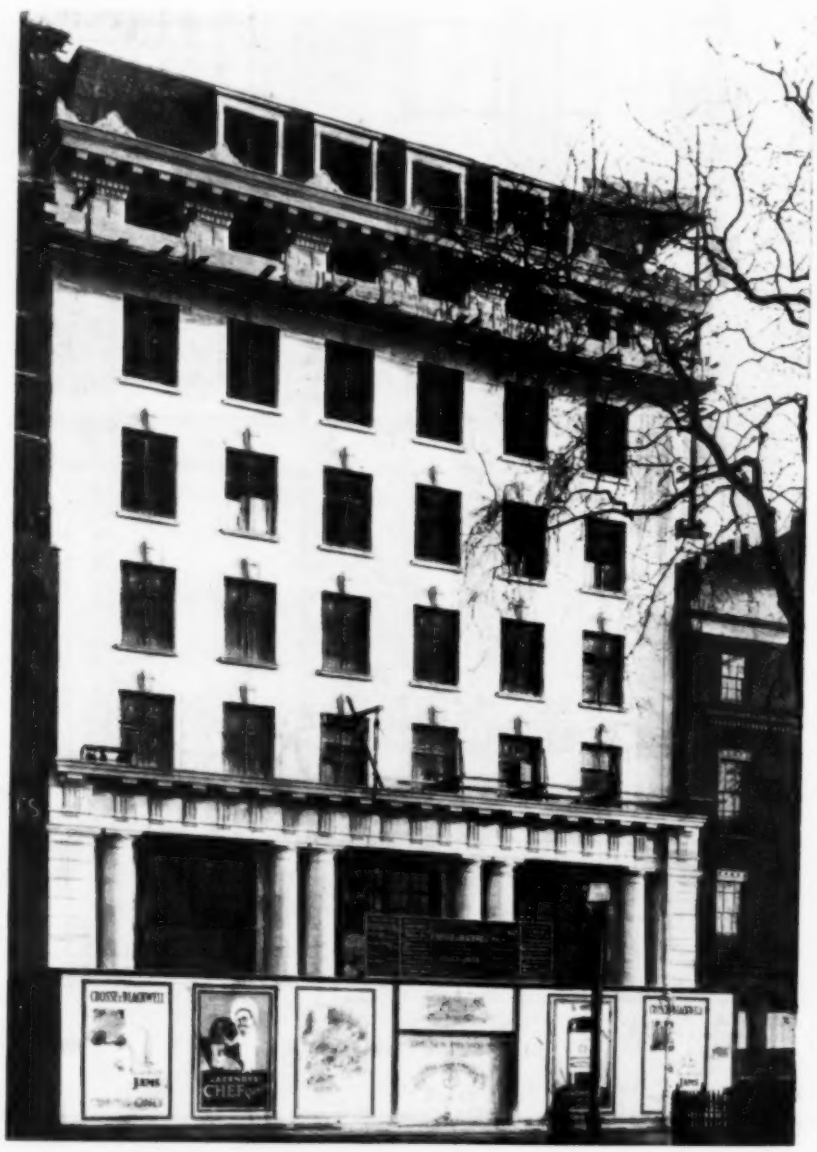
Applications for admission to the next examination for the R.I.B.A. Diploma in Town Planning, which has been arranged by the R.I.B.A. for its members and licentiates, must be sent to No. 9, Conduit-street, by March 1, 1925. Forms of application may be obtained on application to the Secretary R.I.B.A.

Architects may be reminded that this examination enables them to prepare for practice in a field where the demand for qualified men at present exceeds the supply; and where for some years there is likely to be an increasing demand. It is very important that architects should not neglect this branch of work, or the allied though more limited work of municipal housing. Such work affords great interest and special opportunity for the application of trained imagination and the art of design to the direct benefit of human communities. If architects are to practice the art of Town Planning they must, however, make themselves masters in the science of the subject. This is not difficult in the sense of involving highly technical matters, but it is extensive, includes many subjects, and involves knowing something of the work of the surveyor, the municipal engineer and the industrial economist. To plan a town or part of a town, the physical, industrial and commercial needs of communities must be understood, as well as the economic and legal limits within which it is practicable to work.

This work calls for a rather different combination of faculties from those which may enable an architect to distinguish himself in the designing of individual buildings. The examination has been arranged to give some guidance as to the kind of knowledge needed as well as to afford a test of competence in it.

Board of Architectural Education.

The questions set at the Intermediate and Final (or Special) Examinations held in November and December, 1924, have been published and are on sale at the Royal Institute, price 1s. 6d. (exclusive of postage).



New Premises, Soho-square, W. MESSRS. JOSEPH, Architects.

MODERN BUILDING IN AMERICA

By ALBERT LAKEMAN.

Introduction.

MODERN building work in the United States of America presents many points of interest, because considerable developments have taken place during comparatively recent years, and it is impossible for anyone connected with the industry in this country to make a careful study of the American methods without acquiring some useful information.

At the outset one is impressed by the magnitude of the undertakings and the enormous scope for the contractor with a big organisation, but a further study of the industry will reveal that the comparatively small schemes are also worthy of attention, as the progress in construction methods is not confined to the large projects alone.

One of the outstanding features of American construction is the progressive nature of the industry as compared with the general lack of rapid development in this country, and there appears to be several reasons to account for this feature. In the first instance, there has been a very rapid growth of important industries in America, which is rich in natural wealth, and the extensive development of the whole country has taken place in comparatively recent times, and the development of the building industry has obviously been affected by this. Again, the scope of the industry generally is much greater, owing to the enormous area of the country, and to the extensive field which is open to the progressive man; while the natural conservative tendency that exists on this side of the Atlantic does not appear to any extent on the other side; and, in fact, it will be found that new ideas appeal very strongly to the American contractor, and he will try them at the outset with little or no persuasion. Other features that have contributed to progress include the extensive research work which is carried on in connection with building work generally, as is evidenced by the numerous bulletins issued from time to time and the absence of restrictive by-laws framed for obsolete methods and materials. Apparently, no scheme or method is considered impossible, and a very wide outlook is taken; while difficulties that arise are overcome in a manner which indicates considerable enterprise. It is true that the American contractor will take risks, in spite of the great attention that is paid to "Safety First" in that country, but he usually gets through the job without serious mishap by speeding up the work and reducing the risk period to a minimum. "Taking a chance" is a typical American expression, and it is applied in some building work in a manner which would not be permitted in this country, even if a contractor was prepared to undertake work by risky methods. All forms of shoring and strutting are reduced to a minimum; scaffolds are of the suspended type or conspicuous by their absence; and heavy materials are handled above workmen with the minimum amount of protection.

On one large scheme it was found that the poles carrying several high tension power lines were in the way of a large excavation that was necessary in connection with a subway, and the writer was surprised to find that the contractor was moving these poles several feet back from their original position without cutting off the current. When the supervisor's attention was called to the serious risk, owing to the large number of men working in the vicinity, should

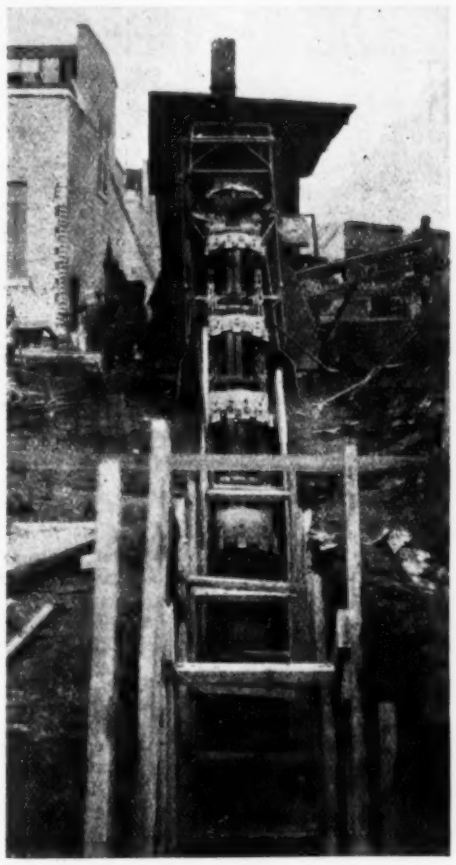


FIG. 1.—TRENCH CUTTER AT WORK.

one of the poles fall or one of the cables break, the explanation given was that the cutting off of the current would entail the stopping of the various equipment on the site and delay would be caused, which could not be entertained. No special precautions were taken, but the work was successfully carried out and the contractor's object achieved.

Organisation.

Thorough organisation is considered an essential feature in American construction work, and considerable time is given to the questions of the lay-out on the site, the equipment to be used, the transport of materials, the sequence of the various sections of the scheme, and the numerous items which will influence the success of the job. This planning and general organisation is not left until the work is commenced, but is thoroughly studied before the work is started. In the middle west portion of the country, which is the chief industrial section, the weather conditions require to be taken into account because building is practically a seasonal occupation, and generally speaking the work cannot be carried on during the winter months, except under great difficulties and at considerable extra expense. The winter months are utilised by the contractor's staff in the planning and preparation necessary for any schemes which are to be started in the following spring, and thus the work can be carried forward without delay, and a certain point can be reached by the time the severe frosts set in, which will stop all outdoor trades. The principal contracting firms employ a large staff of organisers, specialists and draughtsmen, and they have, usually, an elaborate system to cover every department and branch of the business. Apart from the president and vice-presidents—the latter being generally acting members of the concern—there are separate departments, each under a highly trained man, for the engineer's work, the architectural work, the estimating, the accountancy, the buying, and the surveying. The engineering section is divided into groups dealing respectively with mechanical, electrical, constructional, and other problems, and a specialist is retained for each section. If required arrangements can be made for the whole of the organisation to be retained for a large scheme, either by payment of a percentage on the cost of the work, or for a lump sum fee, and this organisation will deal with the whole scheme from the preparation of the working drawings to the finish of the complete work. Charts and records of every description are part of the routine work, both before and during the execution of the construction, and standardised forms are adopted by each firm for all uses, from a workman's pay check to a record chart showing the estimated and actual progress of the building itself in all trades. Particular attention is paid to the lay-out on the site itself as regards the position of any stationary equipment required, and the general sequence of the work in relation to the receipt, unloading, and handling of materials.

The control of stocks and labour and the efficient supervision on other points which are dealt with during the preparation of the lay-out and the frequent removal of temporary buildings is avoided. Immediately the work on the site can be commenced the plant is forwarded to the job and the installation of tracks, towers, concrete mixers, and other equipment is pushed forward, together with the erection of temporary wooden buildings for offices and stores. The setting out is dealt with by the contractors' staff and profiles are erected. The writer was impressed by the general knowledge of surveying instruments and methods that is found in the ordinary architectural and engineering assistant,

FIG. 2.—STEAM SHOVEL EXCAVATING FOR BASEMENT.

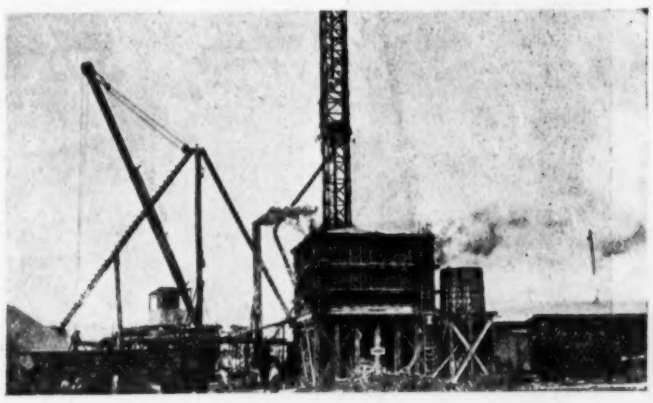


FIG. 3.—CONCRETE MIXING INSTALLATION.

as the juniors all appear to be familiar with the use of the theodolite and level, whereas in this country many assistants after several years of experience in the profession cannot work with these instruments. On the other hand, however, there is a surprising lack of knowledge in connection with the preparation and use of quantities in the average American building organisation. The quantity surveyor is practically unknown at the present time, and an advertisement for an assistant with a knowledge of quantities will result in disappointment. During the past few years a firm of quantity surveyors have opened an office in New York, and one of the staff can be hired from this firm for any special work, but the general use of a proper bill of quantities is not recognised as essential. The firm above mentioned issue a circular setting out the advantages of carrying out work with the aid of properly prepared bills of quantities and an attempt is being made to get the recognised method in this country adopted in America. The American work at present is carried out with the aid of approximate quantities prepared in a rough and ready method by estimators who compile general tables under each trade but without any thorough detail and these tables are checked and revised from time to time as the work proceeds. Orders for materials are placed on the first approximate particulars, and a minimum quantity is stated ; or the order contains a clause providing for the amount to be more or less, according to requirements. It will be obvious that estimates given on this basis are seldom accurate, and lump sum contracts do not become practicable, nearly all the work being carried out on the cost-plus-profit basis.

The employment of sub-contractors for various trades is not generally adopted, although this method is carried on in a small degree, more particularly when a special or patent material or process is involved. Before leaving the subject of organisation the question of expediting delivery of materials should be mentioned. A contractor's staff connected with a large project includes several expediters, these being men situated in different districts where large quantities of materials have been ordered, and their duty consists of following up the preparation and dispatch of the materials at the supplier's works, and seeing that no delay occurs. In the case of any special material which is urgently wanted the expediter leaves the point of dispatch at the time the consignment is sent forward, and follows it to the last junction or possible holding up point before the town or city is reached where the work is situated. At each junction on the route the expediter gets in touch with the local yard-master and uses every possible means to get the material wagon or wagons sent forward, at the same time advising the man in charge

FIG. 5.—FLOATING JIB FOR ERECTING STEEL.

on the site of the position and probable date of arrival at the work. This system is of considerable value owing to the long distances over which some of the materials have to travel and the danger of the wagons being left for several days in one of the large marshalling yards where the goods trains are made up.

Equipment.

The most striking aspect of American construction work is the extensive use of equipment of all kinds and the advance that has been made during recent years is remarkable. Mechanical equipment in this country, which is exceptional, and calls for comment in the daily Press, is in common use in America, and the application of machinery wherever possible is considered an elementary principle. The reasons for this will not be difficult to find, and the chief of these is seen in the cost of labour, which is considerably higher than over here. In 1920 the average rate for ordinary unskilled labour in the building trade was equivalent to 2s. 8½d. per hour, and the skilled trades were receiving the equivalent of 4s. 4½d. per hour, at the normal rate of exchange, and thus the introduction of labour-saving equipment involving quite large capital outlay was justified where the scheme was of a fair magnitude, while the use of machinery on small schemes was profitable when they could be acquired on the hire system. The extensive use of all kinds of labour-saving appliances has naturally led to the development of the equipment, as inventors and makers have been encouraged to produce new and efficient types to meet the universal demand. The hire system to meet the needs of the small contractor has also been extensively developed and the use of a steam shovel, crane or any other large item of equipment for a short period only can be easily arranged, if required, as the equipment is available in practically all districts, and there is no question of delay due to transport over long distances, freight charges, and similar matters. Practically all the American houses have a basement floor wherein the central heating and other apparatus is situated, and it is a common sight to see a steam shovel at work on the excavation for a single house. The method is simple, as the contractor—probably in quite a small way—sends for the local steam shovel, which is on hire; the shovel travels to the site through the streets under its own power, digs its way down to the required level, excavates the whole of the soil, which it loads directly into the bottom dump carts or tipping wagons, and then walks out of the ground again. The whole operation is frequently carried out in one day, and at most in two days, and considerable saving in time and labour results. The execution of work by this means over here is, of course, quite impracticable at the present time as the delay and expense of getting a steam shovel to the site, even if available, and the probable cost of hire for a minimum period based on the owner's requirements, and not on the contractor's, would render the method far from economical. This example is given as typical of the modern American methods, and numerous other instances of a similar nature could be given. Some of the general features of construction methods in detail are here described as they will indicate clearly the progressive nature of the industry.

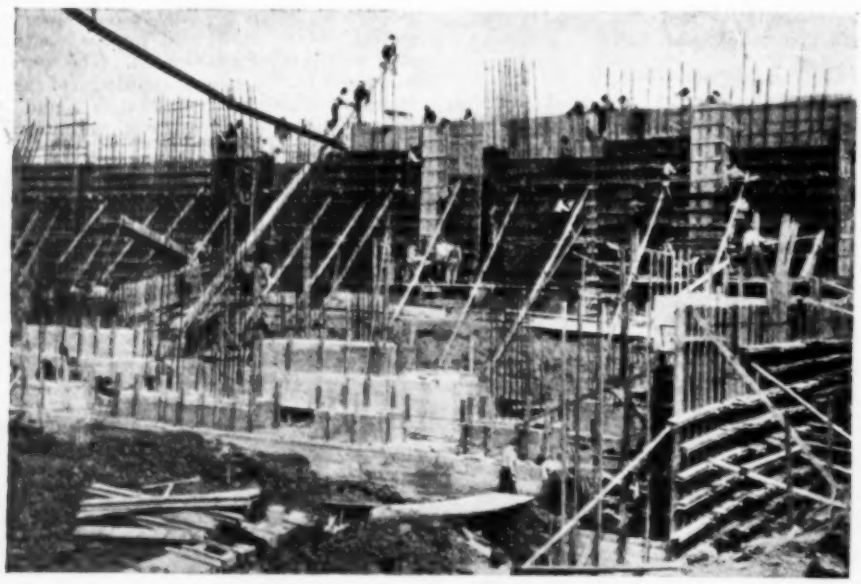


FIG. 4.—PLACING CONCRETE IN BASE OF BUILDING.

Excavation.

Excavation by hand labour on a large scale has been entirely superseded by mechanical diggers of various types, which include French diggers, ploughs and scrapers, steam shovels, grabs operated by locomotive cranes, or derricks and drag-line excavators. Practically all ordinary trenches for wall foundations or pipe lines are excavated by the use of a trench digger, which consists of a travelling carriage moved by steam power or petrol engine, from which a movable steel arm projects at the back to support a revolving belt carrying small shallow buckets fitted with teeth. This type of machine travels forward on the line set out on the work and cuts a perfectly clean trench, the excavated soil being automatically discharged at the side of the cutting for future back-filling or directly into carts or wagons if removal from the point of excavation is necessary. For all depths up to 10 ft. these trench-cutters are practically ideal as regards speed, accuracy and economy, but for depths in excess of this figure the efficiency of the machine rapidly drops. Caterpillar wheels are fitted in practically all cases to allow the machine to travel on soft ground or over uneven surfaces. A view of a trench cutter at work is given in Fig. 1.

For grading the surface and levelling generally ploughs and scrapers are employed, and these are also adopted for digging large pits under certain conditions. Steam shovels are extensively used for large excavations such as basement floors, subways, cuttings for tracks and deep pits, and they are also employed for digging trenches for sewers and even grading the soil for the ground floor if the area to be dealt with is of any magnitude. A typical example of a steam shovel with caterpillar wheels is shown in Fig. 2, this view being taken at the moment of discharge into a side-tipping

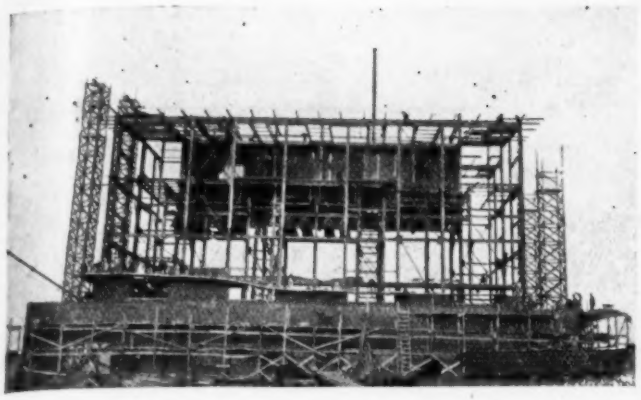


FIG. 6.—SUSPENDED SCAFFOLD AND HOISTING TOWERS.

FIG. 7.—BRICKWORK FOR BOILER HOUSE.

dump wagon running on a narrow-gauge track and hauled by a miniature steam-driven locomotive.

The economy of steam shovel work compared with hand labour is so remarkable that it is surprising to find so few of these machines at work is this country. An ordinary day's work for a shovel having a bucket capacity of 1 cubic yd. is 800 cubic yds., and after making allowance for interest on capital outlay, depreciation, fuel, and wages for the men in charge, it will be found that the cost of the excavation will show a saving of at least 2s. per cubic yd. over that given by hand labour, even when allowance is made for lost time due to the machine standing idle.

Generally speaking the whole of the capital outlay will be recovered in extra profit by the use of the shovel on fifty working days, apart from the question of the saving that must result from the expeditious manner in which the work will be carried out.

Excavation by the use of an ordinary locomotive crane operating a grab bucket is also extensively carried out, and this method is particularly useful when the pit or cutting is a deep one and a steam shovel cannot reach the surface of the ground for discharging the soil, as the crane will work from the original ground level and it can operate over a considerable radius. Although not quite so economical as the steam shovel, this method will show a saving of at least 50 per cent. of the cost of excavation by hand.

Concrete Work.

The efficiency of American organisation in building work is probably more in evidence during the execution of concreting work than in any other section of the industry. The operations necessary to carry out concrete work from the unloading of the raw materials on the site to the removal of the forms from the finished work must be arranged in sequence in a manner which will provide for the maximum output of good work in each trade employed, and should there be one weak link in the chain of operations the whole of the workers engaged will be automatically affected. Ample storage bins are provided with mechanical loaders, these being situated over the mixer, and a good supply of aggregate is provided for. The cement is stored alongside the mixer, and is frequently handled by a motor-driven conveyor belt from the shed to the loading platform, and to ensure a constant head of water a large storage tank is placed above the mixer to make the supply independent of any temporary deficiencies in the amount of water available in the pipe lines that are possibly feeding numerous points on the site. Extensive use is made of hoisting towers and chutes for handling the concrete after mixing, and for transfer to the concreting point. The chutes discharge into receiving hoppers, and transport over the distance between the latter and the place of deposit is dealt with by two-wheel buggies which will take six times as much material as an ordinary wheelbarrow. Owing to the plentiful supply of timber in America the material available for form work is usually sufficient to let the carpenters carry on continuously in advance of the concretors; and, in fact, the limit of speed and output in all the trades and operations is governed by the maximum output of the concrete mixer itself and all other units are arranged to keep pace with this. A typical installation for concrete work in America is shown in Fig. 3, where the large storage bins can be seen in the centre with tower and chute in the background. On the right-hand side are situated the storage tank for water and the cement sheds, and on the left is a derrick used for unloading the aggregate from the railway wagons and hoisting same up direct into the bin. With a concrete mixer having a capacity of 1 cubic yd. it is quite usual in American work for the concrete to be mixed, handled, and placed at the rate of 1 cubic yd. per minute with an installation of this type.

An example of reinforced concrete work being executed is given in Fig. 4, and it will be noticed that there is evidence of ample timber for form work but very little scaffolding.

In large buildings of reinforced concrete construction considerable expense is saved by the introduction of proper inserts in the beams and slabs for the attachment of pipes, conveyors and other equipment throughout the whole structure, thus avoiding the cutting of holes after the concrete is hard and by placing the electric light conduits and outlet boxes on the reinforcement and formwork prior to the concrete being placed, this method being cheaper and quicker than the fixing of the conduit to the surface of the finished work. Concrete floors are frequently finished to a good surface with wood and steel floats to save the cost of granolithic, and many examples of similar ideas that are followed could be given.

In spite of the plentiful supply of timber and the speed and skill of the American carpenter in what may be termed "rough carpentry," metal forms are used for columns and other features as these forms can be hired on reasonable terms. There is probably no more striking example of the value of the labour-saving machinery in America than the fact that the multi-story building is cheaper per sq. ft. of floor space provided than the single story, because the work is centralised, and the equipment can be used to the best advantage, whereas in this country the single-story type will generally prove the cheaper of the two, as the use of large items of equipment is not taken advantage of for multi-story buildings.

Steelwork Construction.

The methods employed in the erection of steel framed structures are very up-to-date, and all kinds of hoisting appliances are used. The "Scotchman" type of derrick used in this country is practically unknown, and the cranes and derricks, in the case of a high building, are taken up with the framework and carried by the steel erected at the highest level. An illustration of the use of a "floating jib" for the erection of steel framing is given in Fig. 5. This structure was 150 ft high, and this jib was taken up with the framing to the full height, the actual hoisting power being supplied by a steam-driven winch. It is interesting to note the positions of the steel-erectors in this illustration. These erectors are very daring, and will execute work without ladders, scaffolds, platforms or practically any of the conveniences generally adopted over here. Extensive use is made of pneumatic hammers for riveting steelwork on the structure, and bolting is only resorted to where allowance for expansion is necessary. There is no doubt that the Americans are expert in the construction of large steel

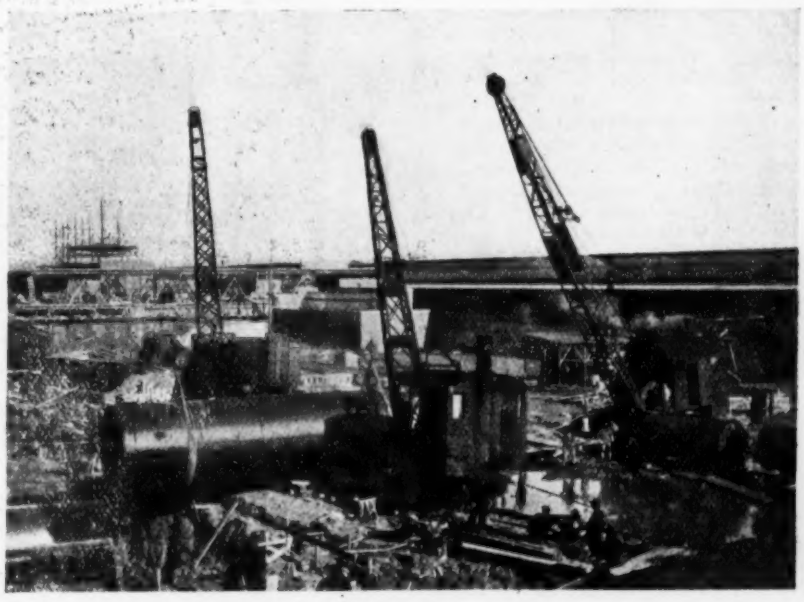


FIG. 8.—CRANE HANDLING LARGE TANK.

frame structures, and while the necessary appliances for lifting are always used the remainder of the equipment is reduced to a minimum to avoid delay in moving from one position to another during execution.

Brickwork.

In the execution of brickwork a very good output can be relied upon if the job is well supervised, and generally speaking better facilities are given for the handling of the materials than is the case in this country.

Suspended scaffolds are frequently used, and these can be raised by the bricklayers and their labourers as the work proceeds without having to wait for the attendance of scaffolders, and in addition the scaffold can be kept at a convenient level at all times in relation to the level of the work.

Considerable use is made of material-hoisting towers, these being roughly framed up in timber and erected to the full height of the building. An example of these towers is given in Fig. 6, where the erection of a large boiler-house is shown. The suspended scaffold for the bricklayers is also shown, and it will be noticed that this is at varying levels to suit the different stages of the walling. The hoisting towers are fitted with guides and platform hoists operated by steam winches, and bricks, mortar and all similar materials are raised by these hoists to keep the workers supplied. Many of these towers are also fitted with swinging jibs near the top for the purpose of raising timber reinforcement, and other materials which cannot conveniently be raised by the platform hoist. The speed of the work attained by the use of the suspended scaffolds and the material-hoisting towers is well illustrated in Fig. 7, which shows the result of one week's work on the building given in Fig. 6. The quantity of bricks laid in seven days was roughly five hundred thousand in this structure, and it will be appreciated that the supply of the necessary materials to the bricklayers could not have been maintained without some special arrangement for hoisting such as the four towers here shown.

Generally.

The typical methods herein briefly described for some of the principal trades are applied throughout the building industry and the labour-saving appliances adopted are worthy of consideration in this country. The quality of the work executed is fairly good, while perhaps not quite up to the same standard as that generally prevailing here. In plumbing work, however, American practice is excellent, and the quality and finish is superior to that in this country.

In many schemes there is a tendency to be extravagant and wasteful in material, while rigid economy is practised in labour, and the accumulation of "funk" is a bad feature. No difficulty is experienced in supplies of building materials, and contracts for large quantities can be arranged on very advantageous terms by getting in touch with the suppliers and driving a bargain in spite of apparent trusts and combines. Many other features and examples of American methods of interest could be given, but a very long treatise would be necessary to cover all the different trades in detail. The illustration in Fig. 8 shows the handling of a large tank with three locomotive cranes, and this is typical of American work. In conclusion, it may be stated that big things appeal to the American contractor, who thinks "big" and organises on a big scale, and this is due in a large measure to his environment.

Yorkshire Housing.

The development of new coalfields in South Yorkshire and in Nottinghamshire is directly increasing the number of houses that are being erected under the Chamberlain Act. Arrangements have just been completed by Messrs. Pease & Partners, of Darlington, for the erection of 1,000 houses at Thorne, a little village near Doncaster. Here coal has just been reached after operations during the last ten years, and the immediate need is for increased housing accommodation for the extra miners to be employed. Mr. Jarvis, of Darlington, is the architect. The Housing Corporation of Great Britain, of which Lord Askwith and Lord Denbigh are directors, and Major Douglas Wood, F.R.I.B.A., and Mr. Lloyd Thomas, formerly Housing Commissioner at the Ministry of Health, are consulting architects, have been appointed as consultants. A feature of the design of the houses will be the bathroom arranged specially for the convenience of the miners who are to be the householders. This large housing scheme is not far away from that which is now being developed at Hatfield, in South Yorkshire, where there has been an exceptional output on the part of the operatives employed, whose wages have been correspondingly high.

Ellerman Lines Building, Leadenhall-street, E.C.
MESSRS. JOSEPH, Architects.

STEEL FRAME BUILDINGS

THE NEED FOR REVISED REGULATIONS

By EWART S. ANDREWS, B.Sc.Eng., A.M.Inst.C.E., M.I.Struct.E.

It is now fifteen years since the Act of 1909 governing the erection of steel frame buildings in London came into force, and experience in designing under the Act has convinced most structural engineers that this Act is in urgent need of revision because it makes a number of requirements which result in an unnecessary addition to the cost of the building.

One of the advantages claimed for the steel frame method of building is that it enables us to obtain good strong buildings at reduced cost; owing, however, to difficulties which were probably not foreseen at the time of drafting the Act, when experience in this type of building in this country was not very wide, many London building owners have found it cheaper to provide the thick walls in accordance with the older Acts and to carry all the internal portion upon steelwork which could be designed without reference to the 1909 Act, rather than to construct a steel frame building.

Before the difficulty can be remedied a new Act must be passed giving the London County Council power to make regulations governing the erection of steel frame buildings with the necessary consultation with the professional societies; this will enable such future revisions as may be found to be desirable to be effected without setting into operation the formidable machinery of an Act of Parliament.

It is very desirable that the rules governing the erection of buildings may not differ from town to town; at present one may do on one side of a road what is not permitted on the other. Some official or semi-official body should prepare a standard specification for steel frame buildings, and all local authorities should adopt it. This might be done by the Ministry of Health, if it must be an official body, or by the British Engineering Standards Association if a semi-official body is preferred. On the whole, perhaps, it is preferable that the B.E.S.A. should prepare a British Standard Specification for Steel Frame Buildings; this could relatively easily be revised from time to time as conditions alter or as new circumstances arise. The B.E.S.A. has already published an excellent British Standard Specification for Girder Bridges (Report No. 153; Parts 1, 2, 1922; Parts 3, 4, 1923), and this could form the basis for a corresponding Specification for Steel Frame Buildings. If this were done the L.C.C. Act need only state that the design and construction of steel frame buildings must comply with the British Standard Specification for Steel Frame Buildings from time to time in operation; this is already done for the quality of steel to be used.

We will now consider some of the principal points on which revision of the existing regulations might be made, it being, of course, understood that some of the matters to be raised involve technical considerations upon which engineers differ to some extent among themselves. Now is the time to discuss these matters, and to come to some decision which shall be a reasonable compromise between conflicting opinions.

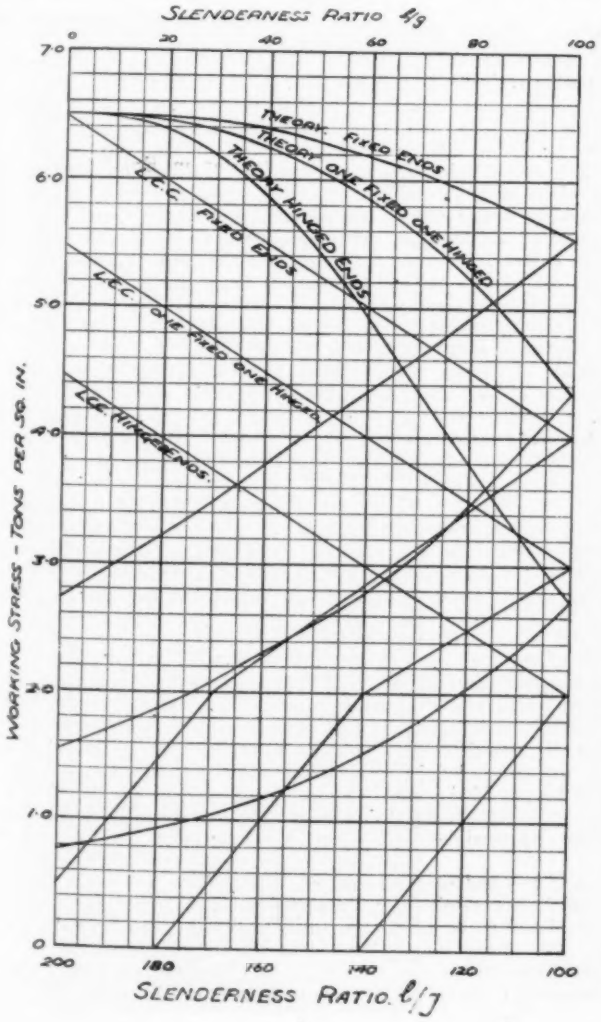
Floor Loads.

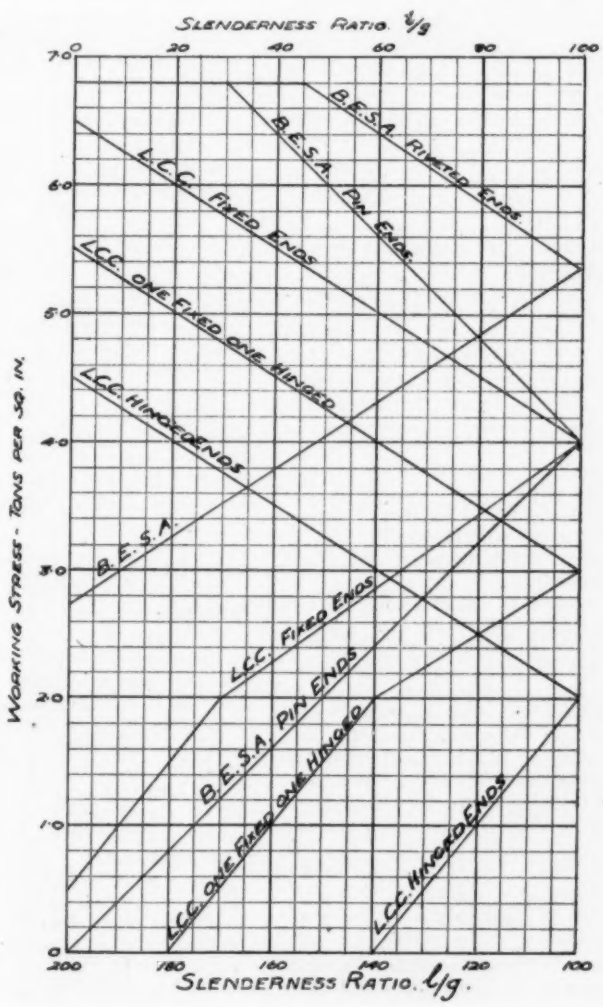
There is no doubt that the floor loads specified in the Act are high. In this connection the floor loads to be taken should be those likely to arise under reasonable conditions in practice; the working stresses are so chosen as to provide the factor of safety that is necessary. In any given building designed in accordance with the Act the load required to cause failure will be at least three times the design load; this probably errs here on the low side, and in many cases it will be nearer five times. Suppose that a floor is designed for 100 lb. per sq. ft.; the dead weight of this floor with plaster and floor covering will be about 72 lb. per sq. ft. (assuming a 5-in. floor). This means that the design load is 100+72=172 lb. per sq. ft. Undoubtedly the least load to cause failure will be 172×3=516 lb. per sq. ft., giving a superimposed load of 444 lb. per sq. ft. Now, 100 lb. per sq. ft. is the design load specified in the Steel Frame Act for office floors; but it is unreasonable to assume that an office floor can ever get 444 lb. per sq. ft. upon it over every square foot.

It is important to realise the order of the floor loads as they actually exist in office buildings. Very careful surveys were made in 210 office buildings in Boston; the actual weights of furniture, fittings and occupants were estimated for all the floors of these buildings and were reduced to distributed superimposed loads per square foot. The highest load measured in any of the 210 offices was 40.2 lb. per sq. ft.; the highest average of 10 floors was 29.8 lb. per sq. ft., and in many floors the load was less than 10 lb. per sq. ft.

It is, of course, true that allowance must be made for foolish people placing heavy articles such as safes on a floor, but the important thing is that people do not put safes all over the floor. Even if they have a hobby for collecting safes, they presumably must leave enough room between them to enable access to them and the doors to open.

Difficulties of this kind can be removed by making it an offence to overload a floor; the District Surveyor should have power to inspect a building (whether steel frame or not), and in the case of dangerous overloading he should have the power to have penalties inflicted. The present Steel Frame Act states in paragraph 22 (18): "In every building of the warehouse class a notice shall be exhibited in a conspicuous place in each story of such building stating the maximum superimposed load per square foot which may be carried on





the floor of such story." There does not, however, appear to be any procedure for enforcing this, nor can action apparently be taken under the Dangerous Structures procedure if the load on the floor is more than the design load but there is no other evidence of danger. Some reduction on the floor loads can reasonably be allowed, and the following figures are suggested:—

Superimposed Loads: lbs. per sq. ft.

Kinds of Floor.	Existing Act.		Proposed Revision.
Domestic purposes	70	...	50
Offices	100	...	70
Workshop or retail shop	112	...	100
Warehouses	224	...	150
Roofs (slope under 20°)	56	...	50

These are the loads which could be taken for the actual steel frame; for floor slabs there could be an increase of one-sixth of these values. For columns (or "pillars," as they are called in the Act) and foundations as it is extremely unlikely that the whole of each floor will be simultaneously loaded to the above extent, a reduction of one-third could be allowed for all floors except the top; these reductions apply, of course, to superimposed loads only, and not to the dead load. The principle of this reduction is already allowed in the Act, but the amounts are too small.

Stresses on Pillars.

The working stresses at present allowed upon pillars are much too low; three conditions of end fixing are provided for, viz., both ends, one end fixed and one end hinged, and both ends hinged, the stresses for one end hinged and one end fixed being one ton per square inch less than those for both ends fixed and for both ends hinged two tons per square inch less. The difficulty is aggravated by the fact that many District Surveyors rightly hold the view that in test results on columns the mathematical assumptions made in the "both ends fixed" theoretical investigations are seldom realised; they therefore state that the practical column approaches more nearly to one with one end hinged and one end fixed. What these District Surveyors have not realised is that the figures given in the Act for fixed ends are slightly below the theoretical figures for one end fixed and one end hinged. The writer was present at a discussion some years ago at the Concrete Institute when an eminent engineer who had been responsible for the figures given in the Act said that he put the figures in that particular form to encourage designers to provide good rigid connections and thus benefit from the higher stresses for fixed ends.

This problem involves technical consideration of the greatest complexity into which we cannot well enter here—it has absorbed the minds of most of the great applied mathematicians and scientific engineers for the past hundred years. We will content ourselves by considering in diagrammatic form the stresses allowed under the L.C.C. Act with those required by a modern form of mathematical theory, and also with those allowed by the B.E.S.A. Specification for girder bridges, which is quite recent and may be taken as representing an excellent blend of theoretical and practical knowledge.

In Fig. I we show the stresses for various values of the slenderness ratio. In order to enable the diagram to be more convenient as regards scale, the diagrams have been drawn in two parts; the upper portions should be used in conjunction with the upper horizontal scale of slenderness ratio (*i.e.*, 0—100), and the lower portions should be used with the lower horizontal scale (100—200). The most common value in practice for the slenderness ratio is about 80; let us compare the stresses at this value:—

	L.C.C.		Theory.
Both ends fixed	4.5	...	6.1
One fixed, one hinged	3.5	...	5.2
Both ends hinged	2.5	...	3.8

When we come to slender compression members such as arise in truss members and other members carrying relatively small loads, the comparison is even more unfavourable, especially if the ends are to be regarded as hinged or even one end hinged and one end fixed.

Fig. 2 shows a similar comparison between the L.C.C. stresses and the B.E.S.A. stresses. Here the difficulty as to what constitutes a fixed end has been overcome by restricting the end conditions to two, viz., "pin ends" and "riveted ends." In buildings the pin end condition is very rarely employed, and most cases arising in practice come under the heading riveted ends. It will be seen that the B.E.S.A. specification for riveted ends gives very much higher stresses than the L.C.C., compared even with the fixed end values: taking as before the stresses at the slenderness ratio of 80 as a useful basis of comparison, we see that the B.E.S.A., for riveted ends, gives 5.9 tons per sq. in., while the L.C.C. gives 4.5 tons per sq. in. for both ends fixed and 3.5 tons per sq. in. for one end fixed and one hinged. If the B.E.S.A. figures were adopted very valuable saving in the cost of steel frames could be effected.

The question of eccentric loading of pillars also requires further elucidation; it is full of very real technical difficulties, and practice varies very considerably among different engineers. The subject has been investigated to a considerable extent in recent years, and there is no doubt that the usual treatment of the calculations to deal with this matter in accordance with the Act results in the development of higher equivalent central loads, and therefore heavier sections than are necessary.

Before leaving this subject of stresses, we wish to point out one fact which is often forgotten in comparing British practice with the rules adopted by the many excellent United States' specifications; this fact is that the minimum ultimate strength of British Standard mild steel is 28 tons per sq. in., whereas that of the American steel is 24.5 tons per sq. in., so that to get a fair comparison between British and American working stresses we should add 11 per cent. to the American stresses.

Rivets.

The treatment of rivets in the Act is unsatisfactory in many respects; in the first place the rule that rivets are to be used wherever "reasonably practicable" implies that rivets are always preferable to bolts. Here again there is room for difference of opinion, but the writer believes that where turned bolts are employed they are probably better than rivets in awkward places inserted on the job ("field" rivets as they are called).

The B.E.S.A. specification allows the same stress for shop rivets and turned tight-fitting bolts, and provides that "For connections which are to be made in the field or where block-bolts are used instead of rivets, an excess of 15 per cent in the case of field rivets and 20 per cent. in the case of block bolts over the number required according to the above working stresses, both for shearing and bearing, shall be provided." The most serious objection to the L.C.C. Act in respect to riveting is in respect of subsection 12 (*c*), which states that the foot of every pillar must have a "baseplate riveted thereto with sufficient gusset pieces to distribute properly the load to the foundations and the gusset pieces shall have sufficient rivets to transmit the whole of the load on to the base plate." This incidentally precludes the use of solid round pillars which are often worth the additional expense involved because they save so much in diameter, and therefore minimise obstruction; they are precluded because they cannot very well be provided with gusset plates, and this was probably unintentional on the part of those responsible for drafting the Act.

The real objection is that if the end of the pillar is planed or "milled" accurately it should be allowed to be considered as bearing direct upon the base plate. The gusset plates rivets therefore have to distribute only a portion of the load to the baseplate; many designers take 60 per cent. of the load through the rivets, but the actual proportion should, of course, depend on the relative sizes of pillar and baseplate. This is an important point because it often presents considerable practical difficulty, and therefore involves higher cost to provide the extra rivets called for by a literal reading of the Act.

NEW HEADQUARTERS OF THE AUCTIONEERS' AND ESTATE AGENTS' INSTITUTE

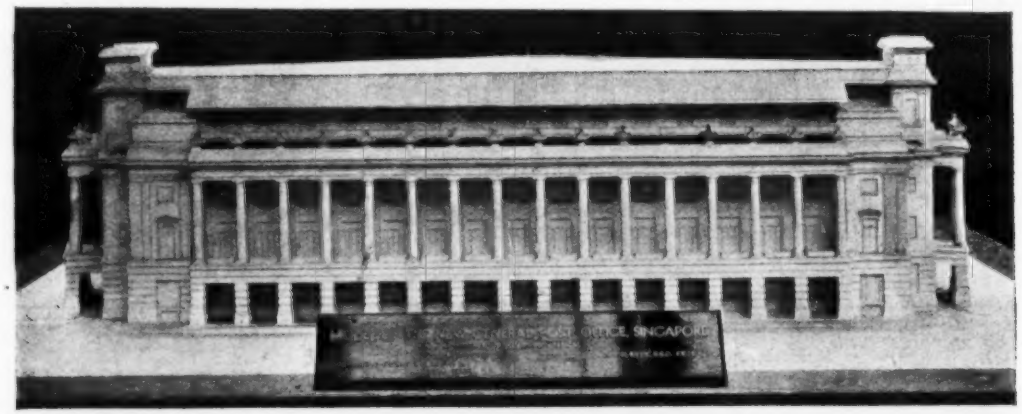
THIS building, the original drawings of which were illustrated in *The Builder* for August 11, 1922, has just been completed. It stands on the north side of Lincoln's Inn Fields, at the east end of the square, with frontages to the Fields, Newman's Row and Whetstone Park, and occupies the site of No. 29, Lincoln's Inn Fields, and the old buildings of Newman's Row.

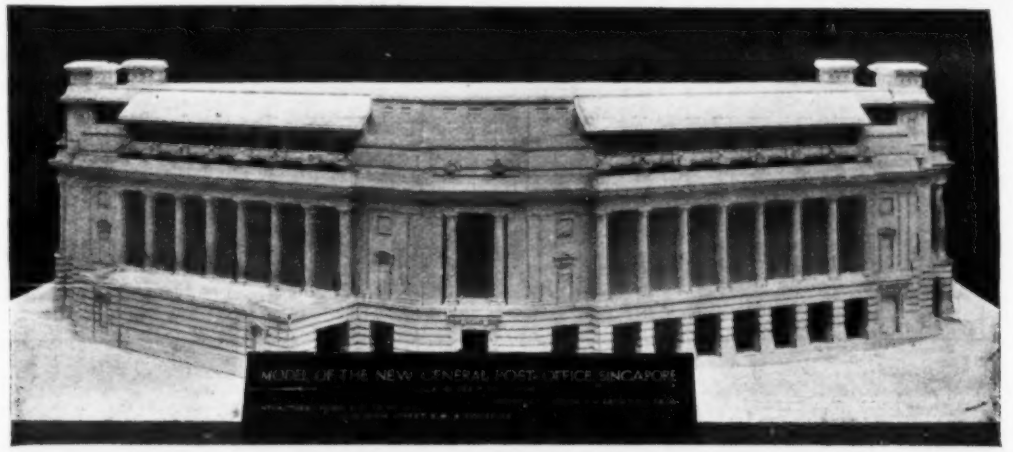
On the ground floor a central vestibule leads to a square entrance and staircase hall; at the sides of the vestibule are the secretary's and waiting rooms, the remainder of this floor being allocated to office purposes. On the first floor is the assembly room, with a committee or reception room adjoining. On the second floor are the council room, library and librarian's room, and on the third floor three committee rooms and the President's room. The basement contains the members' lavatories, the housekeeper's quarters, and strong and record rooms.

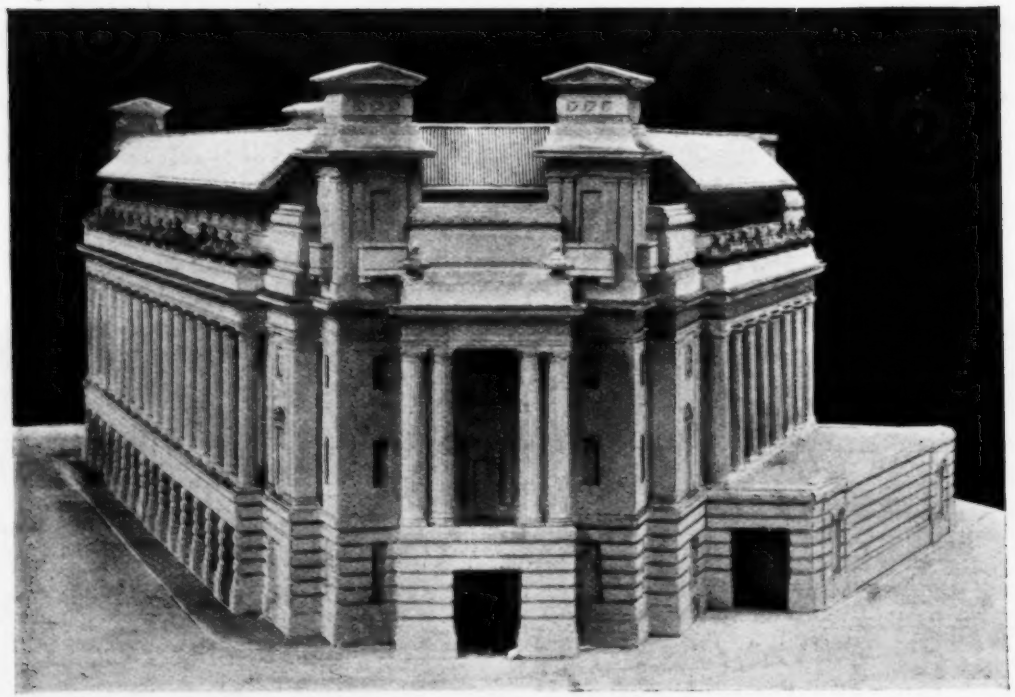
The building, which is faced with Portland stone, has a broad flight of steps leading up to bronze entrance doors, flanked with bronze lamps and with bronze and glass inner doors. The vestibule, which is mainly in marble, has a vaulted plaster ceiling and painted wall decorations in the lunettes. The entrance hall also has its walls and floors of marble, as are the steps and landings of the main staircase; these wall linings generally are of Subiaco, the pavings and steps being generally of Roman stone. The assembly room and reception room are panelled to their full height in Italian walnut. The council room is similarly treated in English oak, and the library is finished in mahogany. The committee rooms on the third floor and the walls of the main staircase are panelled on the plaster in the eighteenth-century manner. The ceilings throughout the important parts of the building are in modelled plaster, the central committee room on the third floor and the main staircase having dome lights.

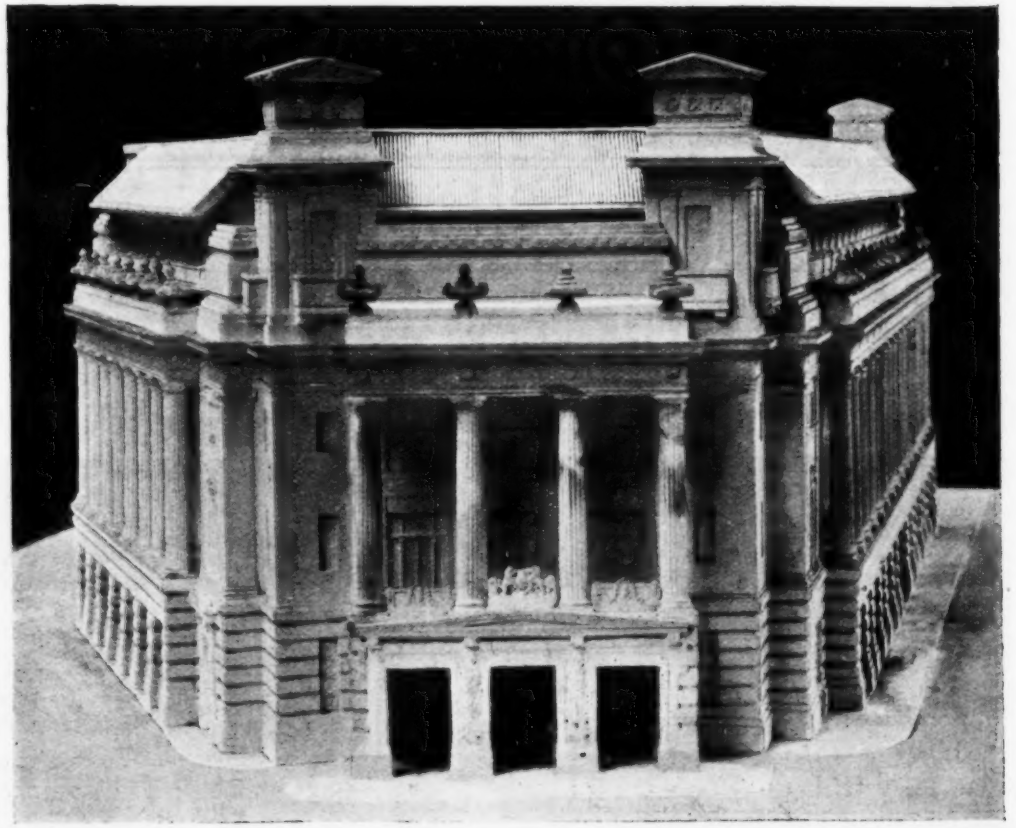
The general contractors were Messrs. Holland & Hannen and Cubitts, who were not only responsible for the erection of the building but also for the hardwood joinery. Mr. J. W. Pritchard acted as general foreman throughout, and the following artists and sub-contractors have been engaged in connection with the work:—Stone carving, Mr. P. G. Bentham, A.R.B.S.; decorative paintings in vestibule, Mr. George Murray; marble work, J. Whitehead & Sons, Ltd.; ornamental plaster work and wood carving, G. & A. Brown, Ltd.; constructional steel work, Redpath, Brown & Co., Ltd.; bronze doors and lamps, balustrade to main stairs, balcony railings, etc., Messrs. Bromsgrove Guild, Ltd.; heating, Messrs. James Gray, Ltd.; electric lighting, Messrs Strode & Co., Ltd.; electric lift, Waygood-Otis, Ltd.; electric clocks, The Synchronome Co., Ltd.; skylights, railings, etc., Haywards Ltd.; sanitary fittings, A. Emanuel & Sons, Ltd.; flooring of certain rooms, Granwood Flooring Co., Ltd.; stoves, Bratt, Colbran & Co.; ironmongery, Yannedis & Co.; internal paint, Paripan Ltd.; furniture, carpets, etc., Spillman & Co.

The architects are Messrs. F. H. Greenaway and J. E. Newberry, FF.R.I.B.A., of Parliament-mansions, Victoria-street, S.W.1.

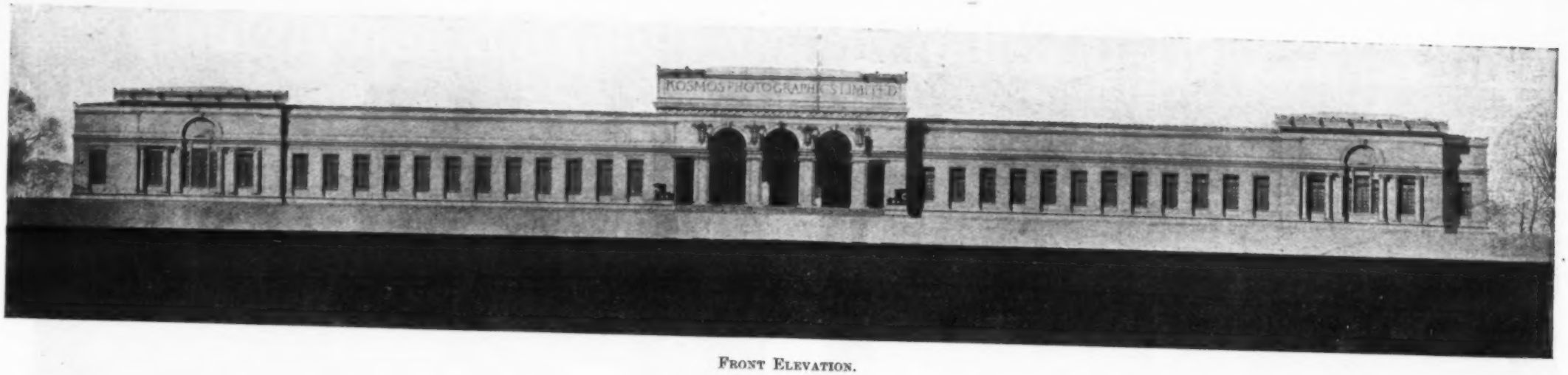




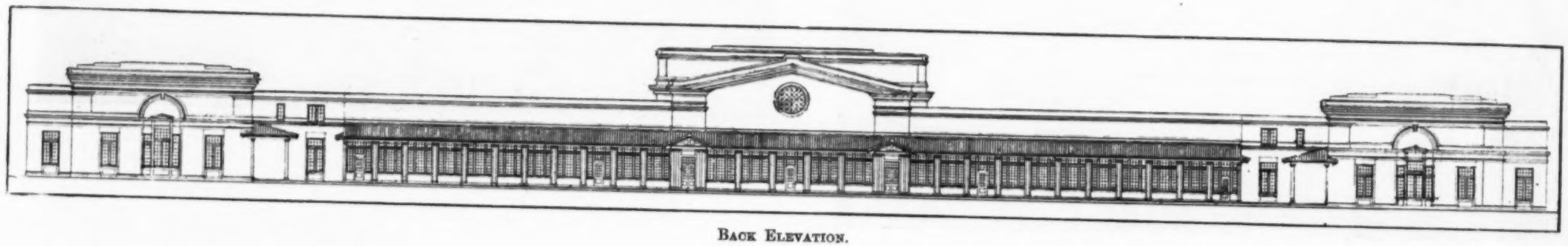




New General Post Office Building, Singapore. MAJOR P. H. KEYS, D.S.O., F.R.I.B.A., Architect. (*See p.* 52.)



FRONT ELEVATION.



BACK ELEVATION.

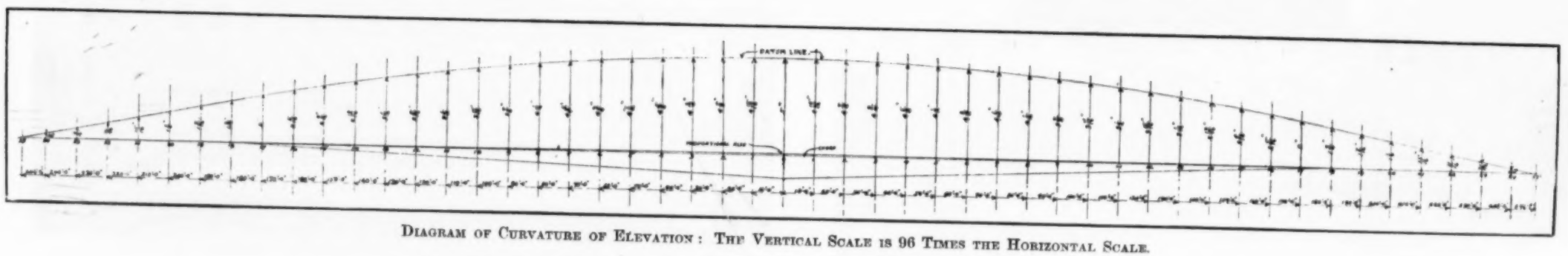


DIAGRAM OF CURVATURE OF ELEVATION: THE VERTICAL SCALE IS 96 TIMES THE HORIZONTAL SCALE.

Concrete Factory Building at Baldock: MR. T. H. F. BURDITT, Architect. (*See p.* 73.)

A CONCRETE FACTORY BUILDING

This building, designed by Mr. T. H. F. Burditt, of No. 10, Grafton-street, W.1, is now nearing completion at Baldock, Herts. The total length of the building is 500 ft., relieved by a central feature and end features. The whole of the building is of concrete with the exception of interior curtain walls, which are of Fletton bricks. In spite of its appearance, the whole of the façade is of concrete cast in the form of bricks, columns, stringcourses, mouldings, and decoration. The absence of windows to the upper story (the building comprises basement, ground floor, and first floor) is due to the fact that this floor is given over to the dark rooms necessary for the manufacture of photographic goods, and no doubt influenced the design of the front elevation.

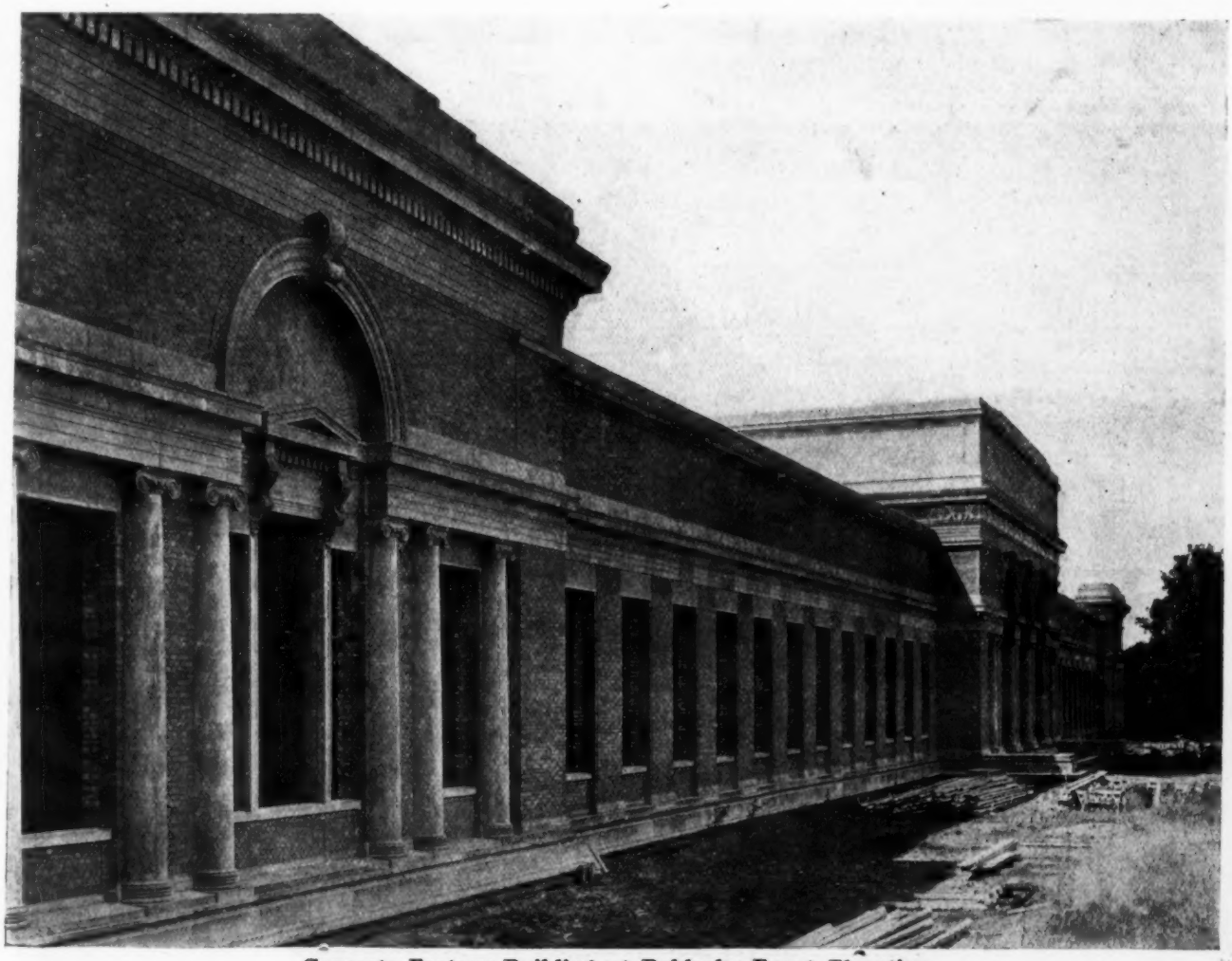
The design is Renaissance in character, but the details more closely follow the original classical models. A practice of ancient Greek architects has been reintroduced of building all horizontal lines in slight curvature, and in this case all horizontal lines, including floors, have an upward curvature measuring 5 in. at the centre over an imaginary chord joining the extremities of the building. The effect is not intended to be obvious, but the building in slight curvature lacks the rigid and mechanical effect of the hard straight line. Also, the external faces of all the walls have a slight batter, inclining from the perpendicular about 1 in. in 12 ft., thus giving an added effect of stability. The axes of the columns are parallel to the batter of the wall. The necking and bases of the columns, however, are not normal to the shaft, but were cast slightly inclined, so that their plane would be horizontal when the columns were set up. This inclination had to be varied for the three types of engaged columns, those facing north, east and south each requiring a different inclination to the axis of the shaft. Another complication which resulted from the batter of the walls was the treatment of the three arches in the central feature. The outer faces of these arches conform to the inclination of the face of the wall. The penetrations of the arches have horizontal axes, while the inner faces of the arches are perpendicular to conform with the inner face of the loggia wall, which is plumb. The centre arch has a diameter of 12 ft. 4 in., while that of the adjacent arches is 12 ft. 1 in.; the slight difference being made to offset the tendency to a feeling of crowding the middle arch. The foregoing features, expensive in stonework, were accomplished practically without additional expense in concrete. The building was not quite completed when our photographs were taken, but we also give the architect's drawing of the front and back elevations. The four lamps over the doorway are an essential feature of the design.

The concrete bricks were made by hand in wooden moulds divided so that five bricks were produced on each pallet. The mixture was used as dry as would permit of workability, and it was thus possible to release the moulds immediately and on the following day to remove the bricks from the pallets, which were then ready for re-use. The cost of these concrete bricks, which were made at the rate of 1,000 per day, worked out at less than the current price of good facing bricks, representing a very considerable saving on a building of this size.

The whole of the column capitals and bases, key stones, architraves, arches, stringcourses, etc., were cast from plaster moulds made from the architect's drawings in his own studio, and have exceptionally clean surfaces, sharp definition, and freedom from hair cracks or blemishes. In order to avoid any air bubbles in the concrete as it left the mixer from affecting the surface of the castings it was poured into pails and stirred until the air was released and then lowered to the bottom of the mould in a small vessel and gently placed in position, further concrete being added to fill the mould so that it did not disturb that already in position. In all the moulded concrete used on the elevations of the building, projections were cast at the back so that the ornaments could be firmly grouted into spaces left for them in the wall.

None of the moulded concrete was cast *in situ*. The capitals of the columns were cast separately, and the shafts, with bases, which are 16 ft. in height, were cast in one piece horizontally and afterwards hoisted into position. Owing to the fact that the columns were more than half a diameter they could not be withdrawn from a jointless mould. A strong concrete trough-shaped mould was therefore made a little larger than the required column, and this was then lined with a plaster waste mould, run in by means of a revolving template. The reinforced column, after seasoning for a fortnight, was removed with the waste mould intact, and the latter was then cleared away, leaving the column free from joints. The concrete mould was then re-lined with a new waste mould for the next column, of which there are thirty-two in all. Wooden moulds were used for the base course, but everything above that was cast in plaster.

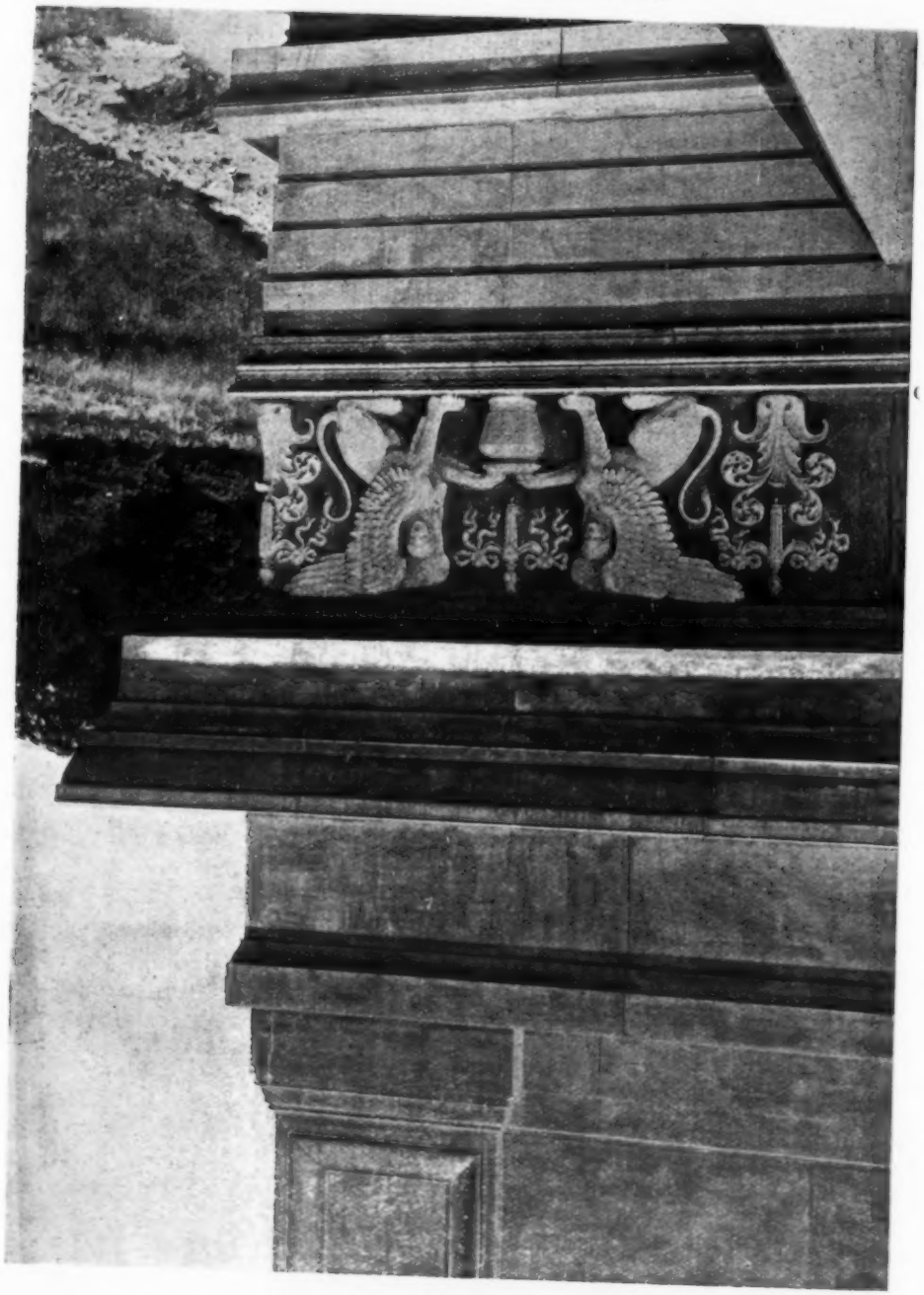
The lettering over the main entrance was specially drawn by the architect on plaster in actual size, so that the lines would not clash with the joints of the concrete blocks, and was



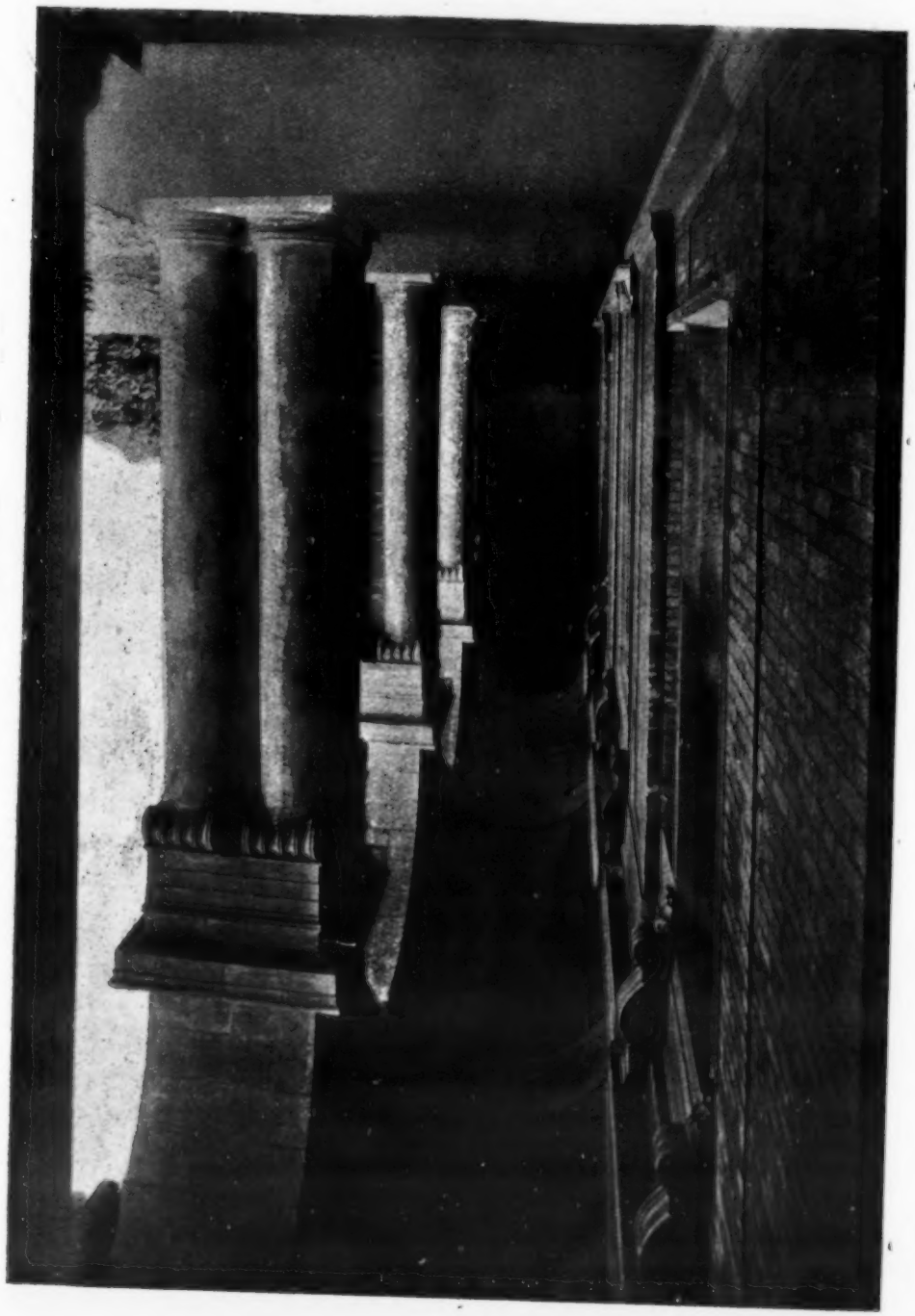
Concrete Factory Building at Baldock: Front Elevation.

MR. T. H. F. BURDITT, Architect.

Concrete Factory Building at Baldock: Mr. T. H. F. Burditt, Architect. (See p. 73.)



DETAIL OF FRIEZE OVER MAIN ENTRANCE.



COLONNADE AT MAIN ENTRANCE.

carved in plaster. From these models moulds were taken from which the concrete blocks containing the lettering were cast. The frieze over the main entrance is of special interest and shows what can be done in this direction. The figure of a winged lioness with a female head is the trade mark of the owners of the building, Messrs. Kosmos Photographics Limited, and this the artist has developed into the *motif* shown in the detail. A white cement was used for the frieze, and this shows up exceedingly well on a deep red background.

The whole of the façade is coloured, and the delicate mauve-grey shade was obtained at no expense for colouring materials by the use of old red bricks. The building is erected on the site of an old red-brick house which had to be demolished, and the old bricks have been used to form aggregate and at the same time supply the colour for the whole of the façades, both for the concrete bricks and the moulded features. For the bricks the concrete was generally composed of 1 part Portland cement, 3 parts sand, and 1 part of crushed red brick, the proportion of crushed brick being slightly varied in order to obtain differing shades in the bricks and relieve the walling from the uninterestingness which must have resulted had they been all exactly alike. For the cast decoration the concrete was made of 1 part Portland cement, 2 parts sand, and 1 part crushed red brick. Here again the proportion of crushed brick is varied slightly in individual castings, and an interesting surface obtained. The larger proportion of water in the decorative features gives them the slightly denser tone necessary to make them stand out from the remainder of the façade, and is typical of the attention to detail so noticeable throughout the building. The background to the frieze is formed of blocks in which no sand is included, the larger proportion of red brick dust providing the deepest tone on the building and making an admirable setting for the white figures. None of the concrete whatever has been touched with a tool after it left the moulds.

The general construction of the building is reinforced concrete floors carried on reinforced concrete columns and beams. The ground floor is poured; the first floor is of Siegwart beams. The roof is of concrete without any covering, a topping of 2 in. of a 1:3 mixture of cement and sand forming a dense concrete which has proved to be absolutely waterproof. Expansion joints are provided every 20 ft. in each direction. The roof is carried on girders 20 in. deep, and a number of these have been cast with aqueducts throughout their length and thus also act as a roof drainage system by carrying the water to the downpipes arranged in the internal walls, an economical device not generally adopted in this country.

The business of the firm is closely allied to art and as a matter of fact the large entrance hall reached through the colonnade at the main entrance is to be used as a gallery in which will be displayed photographs made with the products of the firm. The maximum window space which is a necessity with most factory buildings was not required here owing to the nature of the work to be carried on, and a range of dark rooms is situated on the first floor along the frontage.

We are informed that the building, with a basement and two stories above ground, covering an area of 50,000 superficial feet on each floor, and with much intricate interior constructional work, has only cost about 11d. per cubic foot as it stands to-day, and that when completed it is not expected to cost more than 1s. 2d. per cubic foot including all fittings and decoration.

Concrete Factory Building at Baldock: Main Entrance.
MR. T. H. F. BURDITT, Architect.

THE LONDON COUNTY COUNCIL AND HOUSING

THE pamphlet prepared by Lieut.-Col. Livita, chairman of the Housing Committee of the London County Council, and issued by the London Municipal Society and the National Union of Ratepayers' Associations, as summarised in the *Times*, December 30, appears to contain much matter of interest at the present time. It states that up to March last the capital expenditure of the Council on housing operations amounted to £15,500,000. The rent roll for the current financial year as estimated is £750,000, and accommodation for 121,000 persons has been provided, but when the programme now in hand is completed the Council will have accommodation for considerably over 250,000 persons.

The most interesting portion of the pamphlet perhaps is that which describes the efforts of the Council to forward housing schemes under the various Acts as they have been passed. Thus we find that the Council, which had prepared programmes before the passing of the Housing Acts of 1919, was urged by Dr. Addison to embark upon a larger scheme "without regard to cost or availability of labour and material," and under this pressure the Council had planned within five years to provide 29,000 new dwellings to accommodate some 145,000 persons. Thus 10,000 workmen were engaged towards the end of 1921 and the year 1922 saw 5,186 houses completed, making a total since the war at the end of that year of 6,406. In March of 1922 the new Council found themselves compelled considerably to reduce the programme—there was a penny rate, and prices at that time were more than three times above pre-war. These, however, fell during the year, and we gather that at the end of that year the total number of houses erected since the war was 7,216. With the advent of the Chamberlain Act of 1923 the Council prepared for fresh endeavours, and made financial provision to build as soon as permitted by the Ministry 6,000 houses themselves and to subsidise 10,000 houses to be erected by private enterprise, but up to October 1, 1924, the actual numbers authorised had been 4,344 for erection by the Council and 2,671 from other sources. Then came the Wheatley Act, and the Council authorised a scheme for 20,000 under that Act.

This portion of the pamphlet is more or less historical, but there is other matter of interest but possibly of a more contentious nature. Thus reference is made to the attitude of labour, which is described as a policy of destroying the good feeling between landlord and tenant, and as opposed to assistance being given to private enterprise; and observations on the rate of bricklaying. Thus it is stated that bricklayers used to lay on an average not less than 750 bricks a day, and when paid by piecework up to 1,200, whereas at some period since the war the output had fallen to 300, and that all other workers, carpenters, plumbers, painters, and slaters have reduced their output similarly, doing only about two-fifths of the work they did before the war. The pamphlet states that if payment by results could be introduced it would be equivalent to doubling the number of skilled men.

If the figures given in this pamphlet are correct, and speeding up could be accomplished, it would not only appear to be equivalent to increasing the labour available, but it would have a direct effect on the cost of houses, for the wages bear a direct proportion to the cost of the work accomplished. The pamphlet states that the cost for labour of brickwork is twice as much to-day as in 1914. We quote the passage: "Estimates for building houses before the war were based on a figure of from £4 15s. to £5 per rod for brickwork labour. Now one must estimate for from £10 to £12 per rod, and the work needs close supervision to ensure its being carried out within the estimate. The cost for labour for brickwork, including bricklayers, their labourers and scaffolders, on the average house of the four-roomed type is now between £65 and £75, as compared with £30 to £35 in 1914."

We may point out that these figures must be used with discrimination, as they are certain to be used in some quarters as they stand; and to overstate a case is to damage a cause. The rise in the cost of living has certainly to be considered, and the above difference in cost of labour cannot therefore be attributed entirely to the workmen, but has to be shared by the war.

ARCHITECTS' & BUILDERS' INQUIRY BUREAU

We are glad to give questions and answers, but cannot accept responsibility for contributed replies, especially in legal matters.

May we appeal to our correspondents to submit their queries on paper of a size easily filed, and written as legibly as possible, or better still, in typescript.—ED.

Recovery of Fees.

[REPLY TO "LAW," DECEMBER 19.]

SIR,—It would first need a careful perusal of the terms under which the architect was employed to give satisfactory replies to the questions asked. Was there a contract? Was it oral or in writing? Was it necessary that the contract should be sealed? Is the amount of the remuneration in the agreement? These are questions to be determined.

If there is no express contract as to the remuneration, then only what is reasonable can be recovered; and what is reasonable is for a jury to decide.

If plans and drawings have been used for any purposes, they must be paid for.

No fixed scale of charges is recognised by the Courts; but the practice as to fees adopted by the profession is usually considered favourably.

Competition drawings not used are usually paid for by ascertaining the cost of labour and materials expended on them.

If the terms of the contract were to make plans and supervise work, then a reasonable remuneration is recoverable if work is not proceeded with.

If there is no stipulation as to mode of payment to the architect, then he is entitled to payment from time to time for the work actually done; but, if the terms of the contract with the architect were for an entire work, he cannot recover until the whole work is done, unless other provisions have been made in the contract.

From a consideration of the above and on the facts given, it would appear that in the first question asked, unless there is some express condition as to remuneration, "Law" can only recover for the use that has been made of his plans, &c. In this case there were apparently no tenders received for the church, so very little use has been made of them.

The Statute of Limitations is applicable to this case, as in all other like instances.

In the second case there appears to have been a contract of some kind with the architect, and a breach of it might well be sustained if another architect is employed. A claim could be made for the breach and for the balance of fees at one and the same time, but here again unless the remuneration was fixed in the contract, only what is reasonable can be claimed, and that a jury will decide.

See Creswell on "Law Relating to Building and Building Contracts," pages 143–148.

"AUTHORITY."

Reinforced Concrete Shuttering.

SIR,—For how long a period should the shuttering of reinforced concrete remain in position after laying same and before striking?

"STUDENT."

Coal Crushing Machinery.

SIR,—I should be very grateful if any of your readers could explain to me the purpose of coal crushing machinery as applied to brickmaking. "INTERESTED."

The Origin of the Sash Window.

SIR,—Can you or any of your readers give me any information as to the origin of the sash window and approximate date? It seems to me to have had a considerable influence on Renaissance domestic architecture in this country, yet I can find no reference to the matter in various books on the Renaissance periods. "SASH."

Fireproofing Thatch.

SIR,—I should be glad if you could inform me if any of your readers have had experience with fireproofing thatch for roofing, and, if so, what is the process? Are the reeds treated before laying, or after the roof is finished, and what material is recommended? Will roofs so treated be accepted by the fire insurance offices at the usual risk? "THATCHER."

Measuring Brickwork.

[REPLY TO "ANXIOUS," JANUARY 2.]

SIR,—In reply to the query by "Anxious" respecting measuring brickwork, I would suggest that he purchase a copy of one of the numerous text books on quantity surveying which will supply him with all the information he requires.

WILFRID L. EVERSHED.

SIR,—To describe this operation fully would take a page of *The Builder*. I would state generally that ordinary brickwork is measured superficially, abstracted, and reduced to 1½ bricks. Solid masses are measured cube.

All doors, windows and other openings are deducted, but not flues or stone under 6 in. in height.

Facing-up or any special work is measured superficial, kept separate, and so described.

HENRY LOVEGROVE.

SIR,—The common practice is to measure chimney breasts as though solid, but deducting fireplace openings only, the labour in leaving the flues being assumed to balance the saving of material. Turning rough arches, gathering over of flues, and coring and parging same would also be in addition, and each of these items is measured lineal as a rule. I am not quite clear what your correspondent means by the "advantages" that can be claimed on piecework. I should refer him, however, to the "Standard Book of Measurement" and to Leaning's "Quantities." "ABSTRACT."

Resignation of an Architect.

[REPLY TO "RETREAT," JANUARY 2.]

SIR,—I should think any professional man could resign on the ground of health, but it is usual in such a case to ask some other architect to undertake and complete the work. Under such circumstances an employer would consent.

HENRY LOVEGROVE.

SIR,—This is an unusual question. Generally, the difficulty is to find some means of enforcing an agreement which the employer is desirous of avoiding. Here, apparently, there is an admitted contract, which the architect desires to break—on certain terms, it is true. An architect's contract is personal and his duties cannot be delegated to others entirely, for it remains in force as long as he is alive and in sufficiently good health to perform his part of the contract. Death, insanity, or continued disablement by illness of the architect, will dissolve the contract; anything else, unless agreed upon by the parties to the contract, may mean breach of contract. Therefore, it appears "Retreat" can only make the best terms possible with the employer in order to rescind the contract amicably.

"FORWARD."

Gauged Mortar.

[REPLY TO "STARTLED," JANUARY 2.]

SIR,—I personally think very little of such a mixture as is described; I use either cement or lime, not lime mortar, with a small portion of cement shaken over it before using.

HENRY LOVEGROVE.

SIR,—The practice of gauging lime mortar with Portland cement is generally followed in districts in which the sand readily obtainable is of poor quality and not sharp enough to produce a hard mortar with lime. The small gauge of cement tends to assist matters and the result is an excellent mortar that will hang from the shovel in compact form. The actual reason for this is not obvious, though a chemist would, no doubt, be able to throw light on the matter. "GAUGE."

Knotting.

SIR,—We should be very much obliged if, through the medium of your valuable journal, any of your readers could give us the benefit of their experience of a material which is sold and known as "Stop Tar Knotting." We are not interested in its properties as to keeping back tar or like materials, but when used as ordinary knotting for covering *live* knots. Also, if any decorative material expert could inform us if knotting not containing pure shellac as a base could be depended upon to keep back knots, as mentioned. Our trouble has been that through finished paintwork, which has been knotted, primed and painted three coats with genuine English white lead paint, after a period of time varying from six to twelve months the knots have come right through the painting, just as if no knotting had been used.

"SOUTH COAST."

Gable Walls.

SIR,—In the erection of buildings adjoining existing ones are the owners of the latter entitled to any monetary or other consideration for the use of the present gable wall as the party wall between the two properties?

"BUILDER."

Concrete Walls.

[REPLY TO "CONCRETE," JANUARY 2.]

SIR,—In reply to your correspondent, I should recommend him to try "Rawlplugs" for the purpose. If the tool is handled carefully, it is possible to plug successfully into the hardest concrete block without damaging, and this may be done after plastering if desired, and no making good to the plaster need be necessary. If ashes are used as the aggregate, take care that they are properly burnt and screen out the dust, which is too dead and smooth to be a substitute for sharp sand. If it is proposed to harden the surface, the aggregate used should be non-porous, such as gravel or granite chippings. Silicate of soda is the base of many proprietary waterproofing materials, and it is wise to use one of these and follow the maker's instructions for mixing.

"BALLAST."

Skew-puts.

[REPLY TO "ENGLISHMAN," JANUARY 2.]

SIR,—"Skew-put" is a masonry term, of Scotch origin, denoting a stone built into a gable wall, with a coping mould worked on it in the solid in continuation of the raking coping. The purpose is to prevent the coping from sliding down the gable, and our English equivalent is "kneeler" or "skew-corbel."

"BOND."

Corrugated Iron.

SIR,—Can any of your readers tell me what can be reasonably anticipated as the life of corrugated iron as a roofing material (galvanised, of course). Also whether painting the surface will add appreciably to its life, and if so, what is the best paint to recommend for this purpose?

"ROOF."

Series of Roof Truss Members.

SIR,—I should be very glad to learn any rough-and-ready rules whereby the size of the various timber members of a king post roof truss may be quickly arrived at without going to the lengths of working out elaborate stress diagrams and calculations. "STUDENT."

Clay Foundation.

SIR,—To what depth below the surface should foundations for a two-story dwelling-house be carried, when a hard clay bottom has been reached? "SAFETY FIRST."

THE BUILDING TRADE

ARBITRATION IN BUILDING DISPUTES.

By W. T. CRESWELL, Lic. R.I.B.A.; Assoc. (late Fellow) Surveyors' Institution; Barrister-at-Law.

[It was announced in the leading article of our issue, dated December 26, 1924, that a series of articles on this subject was forthcoming. We now publish No. 1 of this series.]

No. 1.—SUBMISSION TO ARBITRATION.

THE Arbitration Act of 1889 had as its object the making of the settlement of disputes speedy, economical, and final. Prior to that date, the appearance of an arbitration clause in a building contract was comparatively rare; but, since that time, it may safely be said that the inclusion of such a clause has been a growing practice. It is possible to over-rate the function of this reference, regarding it as a means of rendering dispute less serious; but it should only be viewed as a resort where, in its absence, litigation in the courts would inevitably come about. It is intended only as a safeguard. Formerly, there were agreements, either verbal or in writing, to refer disputes to the decision of third persons; but it would appear that these were not enforceable; and there was no hindrance, except that of good faith, to the revocation of these agreements by either of the parties, or to the disputes being carried into the courts, even after the arbitrator's award. Now, however, persons signing any "agreement to refer," or "submission," to arbitration, place themselves under the control of the obligations detailed in Schedule 1 of the Act, so far as they are applicable; unless, by express agreement, they show that their intention is not to be controlled thereby. These obligations include examination on oath or affirmation, the production of all books, &c., and subjection to any reasonable requirement of the arbitrator.

It is the duty of the person who drafts the agreement to do so with all this in view, so that any award or judgment thereon may be readily arrived at, and consistent with the original intention of the parties to the matter in dispute; the language should be as simple and untechnical as possible.

A submission may be a separate agreement or only a clause or clauses in another agreement. In Section 27 of the Act, "submission" is defined as "a written agreement to submit present or future differences to arbitration, whether the name of any particular person to act as arbitrator be named or not." An "agreement to refer," made verbally, is not controlled by the Act, because the terms of it, not being recorded, are open to dispute. There are two general classes of submission—first, "voluntary," or by consent out of court; second, "compulsory," or by the order of the court. All submissions coming under the control of the Act are irrevocable and equivalent to judgments of the court.

In the phraseology of the Act, "reference" and "submission" are interchangeable terms, excepting in some cases where the context makes the distinction obvious. A submission may be simply under hand; or one party may execute it under seal or deed, and the other party under hand only. The stamp duty for a submission under hand is 6d., that for one under seal is 10s. Agreements with public or corporate bodies must be under seal, except in certain specified cases, and must be executed by the other party to the agreement.

Compulsory Arbitration.

When an action is pending, or at any stage of the hearing, a judge of the court may, at his own discretion, and without the consent of the parties to the action, refer the whole or any part of the matter to any of the official referees for inquiry and report, or to any special referee. This is compulsory arbitration.

Certain cases, where, for example, criminal charges are involved, cannot be so referred, but must go to trial by a jury.

It is customary, and at the discretion of the Judge, to invite the parties to agree mutually on a special referee or arbitrator.

The referee or arbitrator, after conducting his inquiry, reports to the court, giving such details and findings as, in his opinion, will assist the judge in confirming his recommendations. His report is of the nature of an award, but subject to confirmation or rejection by the judge; otherwise it is in the nature of the findings of a jury. Types of cases where a special referee or arbitrator would be called upon are those where minute and exhaustive examination of numerous documents is necessary, or where scientific investigation, or technical or local inquiry, is essential. When a dispute has resulted in one party taking out an action, either party, while it is pending, may apply to the court to order compulsory arbitration; and, at any time prior to the hearing, the parties may mutually consent to a submission, when they must apply to the court for leave to submit; the awards in these instances are subject to confirmation by the courts.

No action can be brought in court to compel another to agree to arbitration; but in the case where parties are already bound under an existing agreement or submission, and a dispute arises, the defendant may plead that the matter in dispute is covered by the arbitration clause or agreement; and it is for the judge to decide if this is so, and, according to his decision, send the dispute to an arbitrator or hear it in court as an independent matter. This application must be made to the judge by the interested party and before he has entered on any other legal proceedings; and he must be able to prove that he is able and willing to proceed with the arbitration (see Sect. 4 of the Act). For instance, in Baker *v.* Yorkshire Fire Assurance Co. (1892) 61 L.J., Q.B. 838, an action on a fire insurance policy was stayed on the ground that the policy contained a clause that any differences arising under it should be referred to arbitration. It was held that the policy, though not signed by the plaintiff, amounted to a submission to arbitration within the meaning of the Act. The court ordered arbitration in this case.

Voluntary Submission.

A voluntary submission is one where two parties to a contract agree to refer either possible disputes in the future, or those which have already arisen, to a third person, either named or not, as arbitrator. His award may be defined by the agreement as final or subject to any other provisions mutually agreed, so long as they are lawful. But a simple, unqualified reference is controlled by the provisions of the Act. In some cases the operation of the Act is excluded by express conditions in the agreement. Where any Act of Parliament provides for settlement by arbitration, the Act of 1889 applies, unless the Act in question is inconsistent with the provisions in the Act. As already stated, a voluntary submission may be verbal, but it cannot be enforced as a judgment of the court as can a written agreement, because its terms are not recorded or ndisputable. In certain cases, it can be set aside as void; for example, in connection with a sale of land, where by the Statute of Frauds the contract for sale must be in writing or is void, the submission must also be in writing.

Arbitration Clauses in Building Contracts.

The arbitration clause or clauses in a building contract are inserted to provide means for the settlement of disputes which may arise between the contractor and the employer (or his agent, the architect) concerning matters under the contract. These clauses may provide that the architect's decision shall be final (when he functions as an arbitrator) or they may leave an opening for review of his decisions by a third party, either named or not; or, again, they may provide for the intervention of an arbitrator within certain prescribed limits, not on all points. The clauses may permit of the appointment of one arbitrator, mutually agreed, or of one to represent each party; and, in the latter case, if the "arbitrators" disagree, of the appointment of an umpire by them. To avoid ambiguity, it is very usual to state expressly that the submission is to be "under the provisions of the Arbitration Act, 1889, or any statutory modification thereof for the time being in force;" this precaution is not legally necessary, because Section 24 of the Act claims control by the Act "except in so far as this Act is inconsistent with any other Act regulating the arbitration, or with any rules of procedure authorised or recognised by that Act." It is, therefore, evident that a simply phrased arbitration clause is in the nature of a "submission" under the Act, and irrevocable. If this is not the intention of the parties, it must be expressed, either by definite exclusion of the Act or by the setting forth of some alternative procedure. In any circumstances where an arbitration is outside the operation of the Act, it is subject to control of Common Law.

An agreement as a means to *prevent* disputes is not a submission for the *settlement* of disputes, within the meaning of the Act. In Chambers *v.* Goldthorpe (1901) 1 K.B. 624, there was in the contract a clause that the architect's certificate showing a final balance, after interim payments to the contractor, should be conclusive evidence of the completion of the work. A. L. Smith, M.R., said: "It was argued that there was no dispute between the parties (a dispute being an essential preliminary to an arbitration) prior to the plaintiff giving his certificate, and that unless there was a dispute the plaintiff could not be in the position of an arbitrator. I do not see why there should not be an arbitration to settle matters, as to which, even if there was no actual dispute, there would probably be a dispute unless they were so settled." The Court of Appeal held that the architect was in function an arbitrator when giving his final certificate.

Although many architects prefer to nominate a specific person as arbitrator in a building contract, it is often claimed that, for very obvious reasons, it is more satisfactory to agree on "one to be appointed by the President of the R.I.B.A., or the Surveyors' Institution," or the like."

Business Notice.

Messrs. The General Iron Foundry Co., Ltd., London, inform us that to avoid confusion, the manufacturing branches of their business having greatly increased, they have made arrangements to run, as from January 1, their two factories at Millwall and Brimsdown under separate titles, viz., General Constructional and Engineering Co., Millwall, E., and General Steel Sash and Casement Co., Middlesex. Head office in both cases—to which all communications should be sent—43, Upper Thames-street, E.C.4. They wish it to be clearly understood that they are the actual manufacturers of casements, etc. The showrooms will remain as before.

Liverpool Nurses' Home.

The first completed portion of the Nurses' Home, adjoining the Royal Infirmary, Liverpool, the foundation-stone of which was laid by the Duke of York in July last year, was recently opened. The new wing represents about one-third of the whole projected building, and is composed of sleeping quarters capable of accommodating fifty nurses and four sisters. It has cost £43,000 for the constructional work, and the total sum required to complete the building will be approximately £120,000. The plans were prepared by Messrs. Edmund Kirby & Sons.

HINTS FOR BUILDERS.—I

It may be assumed that the object of engaging in a builder's business is to carry out work reasonably well and secure a fair remuneration for one's services and capital. If these are the main objects of one's endeavour, with the keen competition for work, shortage of labour and materials, they will be found sufficient to test the brain and nerve of any man, because the building trade is essentially a man's business. In this article it is sought to set out in a simple fashion a few obvious hints to beginners, or for those who are not too far advanced by training and experience to care to read other views on the business.

The most practical way for a person to start in business as a builder (providing he has had a fair experience), is to buy a truck, a couple of pairs of steps, and a scaffold board or two, and commence, with a general utility man for assistance, as builder and decorator, having but little capital, very few expenses, and the world before him. Many have started business on these lines; it has meant hard going, hard work, and usually a fair measure of success.

But the matter thus placed in a nutshell hardly conveys the hints necessary to a beginner, which we will set out in some further detail. There are other equally likely methods of commencing business, such as buying a small existing concern with a view to further development, &c. (which view may or may not be borne out in practice), although it should be remembered that the goodwill (if any) in a builder's business is usually a personal one, and, therefore, not readily saleable or transferable, and, consequently, not specially valuable. A few firms have started right away as large concerns, with everything new—from staff to plant—but there are usually some special circumstances attending a commencement of this kind.

Builders may roughly be placed in two classes:—

(1) Those whose main business is contracting for general work.

(2) Those who do work of a jobbing character.

It is of the first-mentioned class to which reference will now be made.

Organisation.

Some form of organisation, even if it is only to a slight extent, is essential, the least possible being a few men to lead in the special trades in which it is sought to engage as a skeleton organisation which can be expanded to suit the general flow of business. The difficulty when commencing in business is to secure sufficient work to enable the employer to attract and keep together the nucleus of a staff, as if he has to rely on casual men for all occasions he would have a very harassing time, and it may be found difficult to finish off a job if the men know they are sure to be discharged at the end of the work; they would probably before completion seek other employment. Some effort must therefore be made to ensure sufficient work for a few permanent men who will be more or less available for any additional work which may come along. It is with this object in view that some firms commencing in business buy an existing concern.

In the smaller businesses the employer would probably be the foreman, timekeeper, casual labourer, estimator, and prime cost clerk in turn. To put the matter briefly, he would control and carry out both the outside work and the inside (or office) work.

Under this method one or other branch of the organisation suffers. If the employer has developed from the mechanic class he will put all his energies into the execution of the work, and the office side of the business is more or less slurred over and not properly done; this, sooner or later, leads the firm to difficulties. If the employer sets himself out as a shining example on the practical side he had better arrange for his office work and books to be done by someone else. Probably some skilled person could keep all the needful books properly written up in a few hours per week, and people are often pleased to do this sort of thing in the evening. This method would enable the builder to secure part-time services of an experienced bookkeeper who for a small sum, would keep his books in order. If, however, the employer is more qualified on the office side of the business he would be well advised to get someone to superintend properly the works in progress: possibly a superior workman or foreman would do.

Further questions of organisation may be dealt with in connection with the items in which they would occur.

Establishment Charges

Such charges must be kept within definite limits and continually scrutinised, as otherwise they are the rock on which many firms split. Rent, rates, taxes, lighting, insurances, interest on capital, and office expenses, would be the main items included under this head. There is no fixed sum or percentage which can be definitely allocated, as it must depend upon the quality and quantity of the work undertaken. Some firms endeavour to keep such charges within the range of the amount of cash discounts received on payments, but very few are so fortunate as to be able to do so. From 3 per cent. to 7 per cent. would be a usual amount, but cases have been known where the establishment charges have equalled 13 per cent., usually with disastrous consequences to the business concerned. It is the unremunerative expenditure which may easily drag down the most promising venture. To avoid heavy standing charges, some firms arrange to sublet most of their work, which is hardly a satisfactory way to carry on and may prove very difficult if a work is undertaken where there is a clause in the contract forbidding subletting.

A builder must have three objects in view: (1) To obtain contracts; (2) to please his customers; (3) to make a profit. If he fails repeatedly in any one of the above he cannot hope to succeed in business.

Having obtained an invitation to tender, an estimate must be prepared. Either the employer must be competent to do this with a little assistance from his permanent staff, or he must employ a whole-time clerk for this purpose or arrange for an independent estimator to price the work, the fees being on the basis of out-of-pocket costs only for an unsuccessful tender and definite fees for a successful one. These fees may be from ½ per cent. to ¼ per cent. for jobs where bills of quantities are supplied. The larger the job the lower the percentage, unless the work consists of a very large number of "spot items" or alterations. Where rough quantities have to be taken out the charge may be 1 per cent. or over. There is, of course, no guarantee from the estimator that the work can be carried out at the figure he produces as a result of his computations, but the estimator employed may be expected to state accurately the prices of materials current at the time the estimate is prepared and upon which he based his figures, so that the amount included for labour and other charges could be deduced. If such an "outside" estimator be employed he could fairly be asked to guarantee the arithmetical accuracy of his estimate, i.e., that the items have been moneyed out correctly and the totals properly checked. The tendency in such cases is for the estimator to be particularly keen on getting the job. A "get the job or get the sack" policy may reduce unremunerative expenditure for estimating, but is not certain to procure remunerative work for the builder.

The percentage of unsuccessful tenders must necessarily vary greatly with the class of work, but in highly competitive work one in six or more has been considered a fair average, but tendering in a select list should give more favourable results. It is reasonable to ask builders to take out their own quantities for works of small extent—say from £500 to £1,000—but where the job is of some magnitude it is unfair to ask six or eight firms of contractors to tender without quantities, as it would mean that each firm would have to spend ten, twenty or even more pounds on the preparation of an estimate with but a small chance of securing the contract. Building employers' associations have rules against tendering for works over a certain amount without bills of quantities being supplied by the building owner's surveyor free of charge.

Rent.

This will vary with the size and description of the business and the district in which it is sought to become established. A shop in a main road may be required, but would probably be expensive, although this may be offset by using the shop for display of goods and the sale of paints, sanitary goods, wall-papers, &c., which may be both an advertisement of the class of work undertaken by the builder and give occupation for a shop assistant or clerk, who would be the person necessary to take messages or instructions at all times. In some cases an outbuilding erected in the garden of the builder's house may serve, with the advantage of the premises being always under the master's eye with some of his family at hand to take messages and reducing the cost of rent to the minimum.

In whatever style or description of business intended, whether such as would require extensive workshops and storage space for plant or the smaller efforts previously mentioned, the rent paid is a serious item as it has to be paid in season and out of season, when work is flourishing and when work is slack, and if the overhead charges are heavy there is always the tendency to secure work which is unlikely to produce a profit but may do something to help to pay establishment charges, and having once engaged in such low-priced work the tendency is to continue with it, to the ultimate detriment of the business.

The rent paid will in a measure govern the amount of local and water rates demanded, so that it is essential that the rent question be carefully considered. There are other charges such as workmen's insurance, use and depreciation of plant and scaffolding, machinery, cartage, supervision &c., which may be counted on as coming under the heading of establishment charges, but as they are usually capable of being allocated direct to the job and thus becoming directly chargeable need not be considered as coming within the range of overhead charges.

"THE CONCRETE YEAR BOOK, 1925"

The 1925 edition of *The Concrete Year Book* is now ready, and may be obtained from No. 4, Catherine-street, Aldwych, W.C.2, price 2s. 6d. net, or 3s. post free. The volume has been considerably enlarged this year, and now comprises 400 pages. It is on substantially the same lines as last year; that is, it is divided into Handbook, Directory, and Catalogue sections.

The Handbook section has been thoroughly revised, and many new chapters added. Notes and authoritative articles are given on practically every aspect of concrete and reinforced concrete design and construction, and a great deal of memoranda of everyday use is included. Standard specifications and design tables for various structures by Dr. Oscar Faber are also given.

The Directory section has been considerably enlarged, and comprises particulars of every business connected with or catering for the concrete industry. A new feature is a complete list of trade names and brands, with the names and addresses of their proprietors.

The Catalogue section, of 180 pages, contains full particulars of businesses and products of a large number of firms, and should be of great value to those seeking firms of contractors to undertake special work or machines or products for special purposes.

The Year Book is edited by Dr. Oscar Faber, O.B.E., D.Sc., M.Inst.C.E., and H. L. Childe.

SOME IMPRESSIONS OF AMERICA

By E. J. STRANGE
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JOURNEYING through more than a score of the northern States of America, contrasting their varying physical conditions, exploring towns and cities, and in some cases their environs, viewing with considerable interest the two-century old cities of the east and the more modern cities of the newly-developed west and north, to see a township of not inconsiderable extent yet of only two or three years' existence, recently gave the writer many impressions of absorbing interest and of continuous educational value.

A British traveller is impressed by the wonderful natural harbour of New York City, with the Statue of Liberty on the left as he approaches from the Atlantic, and the silhouette of the world-renowned, many-storied buildings of Manhattan Island, and ironically thinks of the technical difficulties of anyone desiring to land in the U.S.A. who has not previously been approved by the authorities. Ellis Island, to which those who are in trouble owing to the Immigration Laws are confined, is almost at the feet of "Liberty," except that the symbolic figure has her back to the Island and its sufferers.

The traffic problem of New York City is as great, if not greater, than that of London, although its underground and overhead railways somewhat relieve the street congestion. Some of the narrower streets are one-way only, with the resulting disadvantage that if a particular building is approached in the wrong direction where a vehicle is not allowed to turn it has to pass all round a "block," a distance of one-third of a mile.

Fifth-avenue, the most important thoroughfare from the viewpoint of affluence, with its many hotels, clubs, and magnificent offices and stores, is free from tramways and from the elevated railway, and boasts of an ingenious method of traffic control. Towers are erected at intervals in the centre of the thoroughfare, in which patrol men are stationed to regulate the traffic by means of coloured lamps, thereby requiring the traffic to stop for a definite period while cross-traffic proceeds. In the *Times* it was recently reported that the Home Secretary " was keen to go into the American system of towers for traffic control," but it was noticed on the occasion of the writer's visit that this system requires an unnecessary pause when there is no cross traffic, for the main traffic must wait the required duration.

There are other remarkable and diverse attempts in use by day and by night in the authorities' effort adequately to control traffic and avoid congestion. For instance, automatical electrically-lighted signs are adopted. Away in the west, in Salt Lake City, at a very busy cross-road, a 15-in. electrically-lighted glass dome, whose base is level with the street, marks the centre around which the traffic was required to pass. To the writer it became a point of vantage and safety when it was found to be the only position from which an uninterrupted view could be obtained of the Eagle Gate, with the Utah State Capitol in the distance, illustrated recently by a photograph in *The Builder*. Street refuges for pedestrians are very rarely provided in the States.

In Philadelphia the " patrol " stands in the centre of the cross roads under a large sunshade, with the signs, " Go " and " Stop," above it, giving the device a quarter-turn according to the direction of the traffic he is controlling. Instead of numerous bridges from New York City to Brooklyn, the many kinds of traffic have been dealt with by having in the centre a roadway for ordinary vehicles with a footway for pedestrians and a double railway track on each side, and over these last there is a special automobile roadway on one side and an upper tramway on the other.

In the lay-out of the cities too much praise cannot be given to the local authorities, who spend enormous sums of money upon parks and open spaces and in the demolition of blocks of buildings for the purpose of street widening. At St. Louis, a city of great importance, practically in the centre of the United States, on the west bank of the muddy and sluggish Mississippi, a loan of about £2,000,000 sterling has been raised for new civic buildings, street improvements, etc. In Chicago great sums of money are similarly expended. It is a lake city, and part of the lake is being reclaimed for the purpose of extending its gardens and parks. An ingenious and simple method has been adopted by the engineers for this purpose. The portion to be reclaimed has been dammed off by close shuttering, and as the lake is full of sand in solution sludge pumps are used to lift the water through large-bore rubber suction pipes from the lake into the part to be reclaimed. The sand precipitates and the water flows back into the lake over the dam.

Municipal Buildings and Hotel, Salt Lake City.
[Showing the State emblem, a beehive, on roof of Hotel Utah.]

In older cities, as, for example, Boston and Philadelphia (both famous before and after the War of Independence), there are the tortuous and narrow streets of an English city, where it is impossible to find space to park a car even for a few minutes, but it may be said that generally all city extensions of later years and the newer townships in the west are town-planned on rectangular lines. The planning in the suburbs of such cities as Indianapolis, as well as in those cities of smaller dimensions, is well ahead of requirements. Kansas City is a notable example of wide and well-made boulevards many miles in length constructed many years in advance of requirements. Not only is the sewering done, but also the necessary mains laid to prevent disturbance of the road surface as residences are erected. The financial obligations of this road development rests upon the community. One may contrast this with parts of Germany, in which country, where road-making on a new estate is ahead of development, the cost is equally divided between the community and the owners of the estate, and in this country, where the whole cost of development is usually borne by the owner of the land having frontage to the new roads. Is it too much to hope that local authorities in England may have the power and the willingness to adopt similar or modified financial arrangements so as to ensure wider thoroughfares, more skilful planning, and lay-outs which will be of inestimable benefit to the people of this land in the years that are yet to come?

The buildings, both public and domestic, in America, may be instanced as showing that prosperity in commercial life and standardisation as a product of industry have their reflex in the design and construction of buildings. During the last 200 years the cities have continued to develop from the east to the centre and away out to the western States. Note the eighty-years'-old design of the huge Zeppelin-in-appearance Mormon Tabernacle of Salt Lake City, renowned for its organ and its acoustic properties. Designed in the form of a " barrel " roof rounded at the ends springing a few feet above the ground

The Barrel Roof of the Mormon Tabernacle, Salt Lake City.

The "Old Faithful" Inn, Yellowstone National Park, U.S.A.

surface it is 250 ft. by 150 ft. by 70 ft. high. The main roof principals are of wood lashed with thongs, as when it was erected some eighty years or so ago nails were unobtainable.

The State Parliament Houses are generally variations of classic architecture. The Congressional Building of Washington, D.C., erected on an eminence from which the dome can be seen from a considerable distance, is noticeable for the similarity of style to the Capitols of Albany, Salt Lake City, and others. Some of these domes are painted white, and at night illuminated by powerful electric lights projected over their entire surface.

The post-war craftsmanship in suburban houses is extremely poor in quality, and inquiry upon the point elicited the statement that the higher the cost of building trade labour the poorer the quality of work, but probably the truth may be found in the scarcity of post-war craftsmen and the consequent demand for men insufficiently trained and the high labour cost preventing any finely finished workmanship.

The big cities have enormous palatial hotels, very similar in design and equipment—large, spacious and highly decorated lounges and public rooms—thousands of bedrooms with bathroom and lavatories attached (some luxuriously appointed with iced drinking water laid on in addition to hot and cold water)—with express and ordinary elevators. The Hotel Utah in Salt Lake City is one of the many similarly planned and equipped modern buildings that abound in the cities of the U.S.A. The "beehive" is the emblem of the State of Utah. An entirely different design is to be seen in the "Old Faithful" Inn, one of the three principal hotels in the Yellowstone National Park, and is interesting from the fact that it is entirely constructed within and without of hewn trees in log-cabin fashion. The staircase treads are composed of half trees with the round surface downwards, and floors, etc., are similarly constructed.

In connection with town planning, over 25 per cent. of the urban population are located in what are called "zoned" villages, towns, and cities. In large cities there are zoned areas thus protected from the intrusion of garages, stores, warehouses or factories.

The Secretary of the City of New York Building Trades Employers' Association imparted useful information, some of which may be of interest. Wages of craftsmen, which differ according to the craft, had advanced over 100 per cent. during the last twenty years. For example, in 1903 bricklayers received $5.20 per day of eight hours; in 1920, $10; in 1923, $12. There is no general flat rate, and for overtime double time is paid, except to labourers, who receive time-and-a-half! In view of recent difficulties between organised employers and organised operatives in the building trades in England, a few remarks upon the arbitration plan across the seas devised to prevent strikes and other trade disputes may be added. The clauses provide: The trade unions as a whole or a single union shall not strike against an employer, or an employer lock out a union workman. Within certain defined areas the employer agrees to employ members of the trade unions only. Each association of employers and each union of employees elects half-yearly two arbitrators and two alternates (to whom matters in dispute are referred when the general arbitration board fails to agree) with an umpire—either of whose decisions are final. No lawyer may act as arbitrator, counsel, or adviser.

In concluding this medley of impressions, a builder feels constrained to say that a visit to the U.S.A. is an experience which cannot be forgotten—America is a land of vast territory, illimitable natural resources, where the art of building develops with so great a speed that the old country appears to lag behind, especially in house building, suburban extension, and civic enterprise.

LIFTS.

We have received from Messrs. Stigler an illustrated album dealing with the various types of "Stigler" lifts. In a short history of this well-known lift they state it was about 1870 that Monsieur Auguste Stigler, an engineer of Milan, first evolved the idea of constructing a hydraulic lift, so as to transport passengers to the various floors of an hotel, an experiment which at that period must have been extremely hazardous, and the more difficult on account of the prejudice and scepticism of owners and architects, who could only visualise the new invention as an extremely expensive and very dangerous contraption. Since those early experiments continuous improvements have been made in the design, so that now more than 2,000 Stigler Electric Lifts, embodying the best engineering skill, are turned out annually from their factory in Milan.

COMPARISON OF PRICES OF BUILDING MATERIALS IN JANUARY, 1924, WITH CURRENT PRICES

We have pleasure in publishing a table giving the prices of the principal building materials at the present time as compared with the prices for January, 1924.

Material.	£ s. d. Jan., 1924.	£ s. d. Jan., 1925.	% Fall.	% Rise.
Bricks—				
Best Stocks	3 19 0	4 3 6	—	5.69
Flettons	2 13 3	2 13 3	—	—
Glazed	22 0 0	23 0 0	—	4.54
Thames ballast	0 10 6	0 10 6	—	—
Thames sand	0 15 6	0 14 6	6.45	—
Shingle (¾ in.)	0 14 0	0 12 9	8.93	—
Portland cement	2 18 0	2 18 0	—	—
Ground blue lias lime	2 4 6	2 4 6	—	—
Grey stone lime	2 11 9	2 11 9	—	—
Bath stone	0 2 9½	0 2 9½	—	—
Portland stone	0 4 4	0 4 4	—	—
Good Sound Building Timber—				
4 in. × 11 in.	34 0 0	32 0 0	5.88	—
3 in. × 7 in.	26 0 0	23 0 0	11.54	—
3 in. × 11 in.	34 0 0	28 0 0	17.65	—
2 in. × 11 in.	34 0 0	28 0 0	17.65	—
2 in. × 7 in.	26 0 0	22 0 0	15.38	—
3 in. × 4 in.	24 0 0	24 0 0	—	—
Slates—				
24 in. × 12 in.	37 12 6	37 12 6	—	—
22 in. × 12 in.	34 0 0	34 0 0	—	—
R.S. joists	13 10 0	13 10 0	—	—
Iron—				
Common bars	13 10 0	13 10 0	—	—
Mild steel bars	12 10 0	12 0 0	4.00	—
Steel bars	13 0 0	12 10 0	3.85	—
Cut nails	20 10 0	20 10 0	—	—
Sheet lead	41 10 0	54 0 0	—	30.12
Glass—				
15 oz. sheet	0 0 3⅜	0 0 3⅜	—	—
21 oz. sheet	0 0 5	0 0 5	—	—
26 oz. sheet	0 0 6	0 0 6	—	—
Raw linseed oil	0 4 0	0 4 5	—	10.42
Turpentine	0 6 6	0 5 4	17.95	—
Ground English white lead	56 5 0	62 10 0	—	11.11
White lead paint	79 10 0	84 15 0	—	6.60
Red lead	43 0 0	57 0 0	—	32.56

NEW METHODS OF BUILDING

A RESUMÉ OF ALTERNATIVE METHODS OF BUILDING SMALL HOUSES.

DURING the past few years a very large number of systems of construction have been put forward for the provision of small houses and cottages, and since attention was concentrated on housing after the war the number of such methods approved by the Ministry of Health can be counted by the score. But few of these have, however, been used to any extent. Particulars of most of them have been published at different times in different places, but it is thought that at this juncture, when sufficient time has elapsed to allow thorough tests to be made, and for those systems which for one reason or another have been found unsuitable, uneconomical, or impracticable by the process of trial and error to be eliminated, a brief account of some of those systems which are being used or are likely to be used to any extent will serve a useful purpose in giving in handy form an idea of the number of alternative methods which are available. Such a review also gives an idea of the lines on which those responsible for these new developments have been working, and it will be seen that in practically every case the object has been to reduce the demand for the bricklayer, and this not because any of the materials are claimed to produce a better, stronger, or more attractive

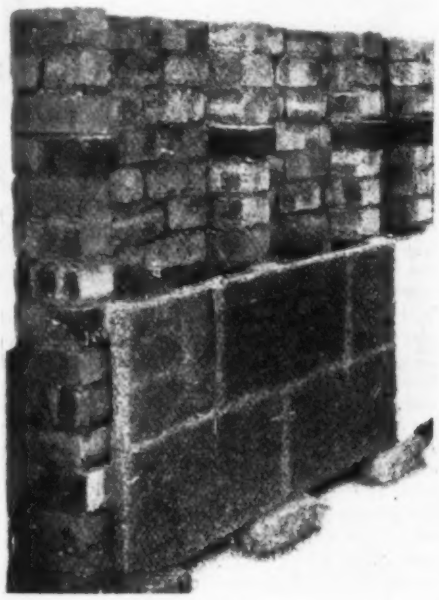


FIG. 1.

structure than brick; nor in all cases is it claimed that the new methods—with the exception, perhaps, of the steel house, which has not yet been built under practical working conditions so far as we know—are cheaper than brick to any considerable extent. Practically all the new systems are, under present conditions, proving to be somewhat cheaper than brickwork, but the chief claim is that methods which do not need the services of the bricklayer make building a more practicable proposition, and that they do make building small houses in large numbers a possibility. It would probably be found that the high wages of the bricklayer, often above the trade union rate, are in some cases the only factor which enables the newer methods to show any saving at all; but bricklayers' wages and the scarcity of skilled bricklayers are present-day conditions which have to be reckoned with, and which make it imperative to consider and adopt other materials than brick if a sufficient number of houses are to be built to satisfy the present urgent demand within a reasonable period.

As will be seen from the methods described, the majority make use of concrete in one form or another. Concrete is, in fact, the only material which has so far seriously challenged brick; whether the new steel houses will oust both for the rapid and cheap provision of small dwellings only the future will show. The extent

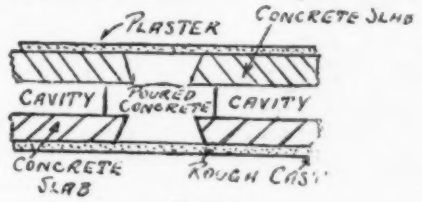


FIG. 2.

to which concrete is being used will be realised when it is stated that at the present time concrete is being used for over 20,000 houses now in course of erection, some in small isolated schemes, some in batches of hundreds, and in Belfast, Edinburgh, Leeds and other centres, in thousands. It is also interesting to note that whereas during the war, for the accommodation of munition workers, and immediately afterwards in housing schemes, various types of concrete blocks were used almost exclusively, the tendency nowadays seems to be to use systems employing larger units, such as the pier-and-panel system. This is probably largely due to the fact that the bricklayers' unions claim that laying concrete blocks is work which should be done by bricklayers, and the increasing use of systems which the bricklayer by no stretch of imagination can claim to come within his province is another indication of the desire to eliminate his services altogether.

STEEL HOUSES.

To start with the newest methods first, pending the revision of some points of detail, some of which are due to the recommendations of the Committee appointed by the Ministry of Health to consider new methods and materials for cottage construction, we are not at liberty to give full particulars of the much-discussed steel houses in which Lord Weir, the Duke of Athol, and others are interested. The interim report of the Committee, issued recently, recommended that this type of house be considered for housing schemes, and that local authorities should undertake the erection of some specimen houses in order to get an idea of the possibilities of this type of construction under actual conditions. Briefly, the system is to erect a framework of timber, to the outside of which is riveted a covering of heavy steel plates. To the inside of the framework is fixed a lining of asbestos-cement sheeting, or similar material, with a cavity between it and the outer steel sheets. The outsides would be roughcasted or rendered to cover the steel. As stated in our last issue, several local authorities are now being asked to fall in with the Committee's recommendation and to erect experimental houses of this type.

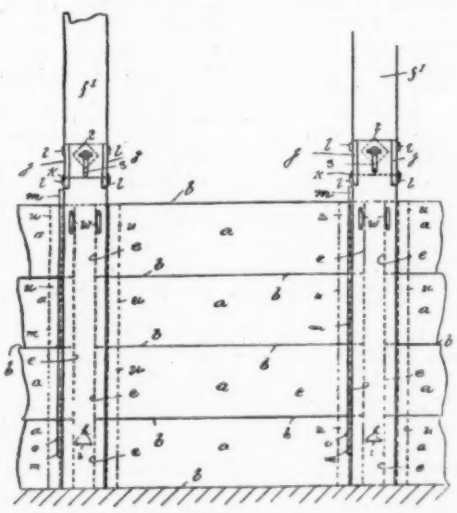


FIG. 3.

BRICK.

Although attention has been chiefly concentrated on methods and materials which are completely new for small house construction, brick has not been overlooked. A method of reducing the cost of brickwork, and at the same time reducing the number of bricks required, has been patented by the Beaverhall Colour Co., of Edinburgh. It is claimed that this method (see Fig. 1) reduces the cost of bricks by 40 per cent. without any decrease in the strength of the wall. In place of the usual hollow wall, a single 4½ in. wall is built with piers at intervals of two brick-lengths. In the building of the pier a brick about an inch longer than the others is introduced; these longer bricks are made of breeze concrete and dipped in tar. To the inner ends of these blocks an inner lining of breeze slabs is attached by spikes or nails, and is thus insulated from damp coming through the brick piers. If a wallboarding be used for the inner lining no plastering is necessary.

CONCRETE.

As stated above, of the methods of concrete construction, the pier-and-panel system seems to be mostly favoured where houses are to be built in sufficient numbers to warrant its use;

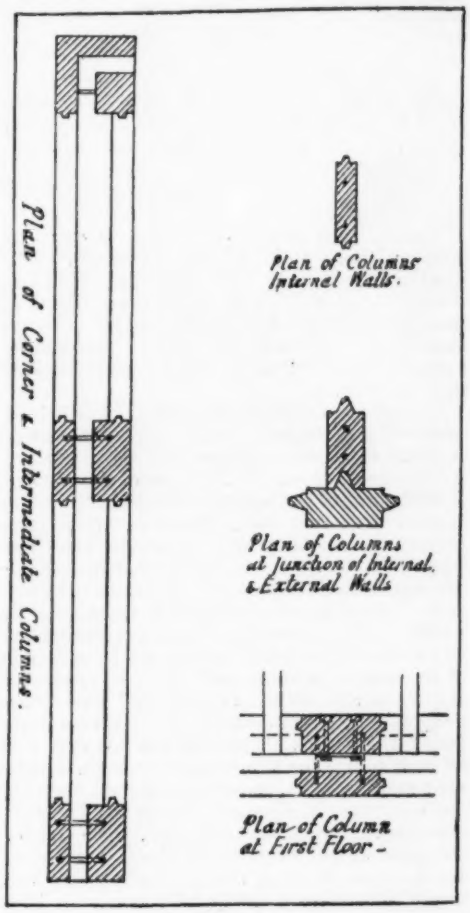

Plan of Corner & Intermediate Columns.
Plan of Columns Internal Walls.
Plan of Columns at Junction of Internal & External Walls
Plan of Column at First Floor.

FIG. 4.

concrete blocks are also extensively used, while monolithic concrete walls are not at present being used to any great extent. There are, however, several new methods now on the market which give promise of a more extended use of this method. No doubt the popular conception of the poured concrete house, based on the Edison system of pouring whole streets at a time, each house of necessity being a replica of the next in order to simplify and make the best use of the formwork, has had much to do with the prejudice against monolithic concrete houses, but as is mentioned later there are methods now available which by the use of shuttering in small units make the poured house a practical as well as an economical proposition for the erection of houses which are not necessarily standardised.

Pier-and-Panel Systems.

A typical example of the pier-and-panel method is the "Duo-Slab" system of Messrs. Wm. Airey & Son, Ltd., of Greek-street, Leeds, an elevation and horizontal section of which are given in Figs. 2 and 3. Briefly, the walling is formed of pre-cast slabs laid on edge one above another with a vertical space between

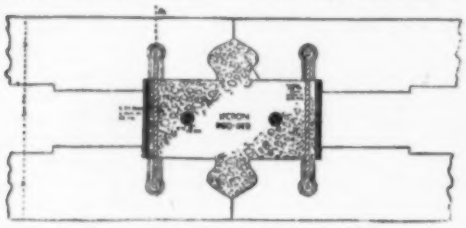


FIG. 5.

each tier of slabs which is filled in with concrete poured *in situ*. The slabs are usually 3 in. thick by 8 in. high by 3 ft. 8 in. long on one face and 3 ft. 6 in. on the other, the difference being accounted for by the splayed ends (see Fig. 2). The piers measure 8 in. across the faces of the wall and 4 in. in the middle of the thickness of the wall. These piers occur at 4 ft. centres all round the building (see Fig. 3). The slabs are made on the site near the footings where they are to be used, to avoid unnecessary handling. As is seen by the section, the walls are formed of two leaves of these 3 in. thick slabs, with a 2 in. cavity, making a total of 8 in. The method of erection is to place the slabs, of both leaves of the wall, one above another without horizontal mortar joints; strips of wood, which are afterwards removed, being used as distance pieces to form the piers. The walls are cement rendered or roughcast on the outer face, and plastered internally.

Another pier-and-panel system is that of Messrs. Henry Boot & Sons (London), Ltd., illustrated in Fig. 4. By this method both the columns and slabs are pre-cast on the site, the columns in moulds and the slabs in pressure machines. The walls are built in two leaves, a separate column being used for each leaf and tied together.

The latest pier-and-panel system, which is in use at Wakefield in the erection of 200 houses, is that of Messrs. Winget (1924), Ltd., of Grosvenor Gardens, S.W.1. One of the distinctive features of this system is that shuttering is entirely dispensed with. The ends of the concrete slabs are so formed that the piers are formed *in situ* as the walls are erected, and the slabs are shaped on bed joints to ensure rigidity and proper alignment during erection. In addition, the top, or male, edge of each slab has two shallow recesses to receive the looped ends of the twisted galvanised wire ties. The ends of the slabs are shaped and rebated to receive pugging strips of asbestos cement or compo board 3⅜ in. wide. The slabs are laid dry, and as each course (or two or three courses, whichever may be most convenient) is laid the pier space between the pugging strips is filled with concrete and reinforced if desired. The ends of the slabs are so shaped (see Fig. 5) that when the concrete forming the pier is set they are firmly tied to the piers by locking joints. The twisted wire ties and galvanised nails which hold the slabs in position during the course of erection are embedded in the piers, and thus increase the bond. There is a "lamb's tongue" joint at the top and bottom edges of the slabs which interlocks the slabs and ensures proper alignment. Four standardised units only are required. The slabs and also the heads, sills, steps, &c., are cast in "Winget" pressure machines.

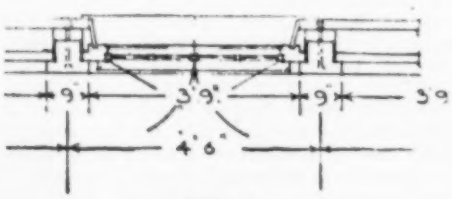


FIG. 6.

Another pier-and-panel system of concrete construction is the "Kent," patented by Mr. H. V. Kent, of 19, Hanover-square, W.1. A skeleton system of reinforced concrete uprights is set up at intervals of 4 ft. 6 in. centre to centre. These piers are connected together with concrete plinth courses, stringcourses and joists, the last-mentioned resting on corbels cast on the uprights, so that all the weight of the house, except the ground floor, is carried on the uprights and none on the panels between the piers. The spaces between the uprights are filled in with slabs 18 in. high by 2 in. thick. At every 18 in. in the height of the piers steel bolts, cast into the concrete, project outwards, and to these the panels, window frames, and door frames are bolted by nuts. There are two leaves to the wall, separated by a 5 in. air space, thus making a 9 in. wall. A section of this type of walling is shown in Fig. 6.

Monolithic Concrete.

So far no attempt has been made on a big scale to pour whole streets of houses in this country, most of the methods of forming monolithic concrete walls making use of shuttering in small units or of a type which can be readily adapted to follow any design. The method of pouring concrete houses complete at one operation is shown in Fig. 7.

With a view to keeping down the cost of formwork in monolithic wall construction, which is

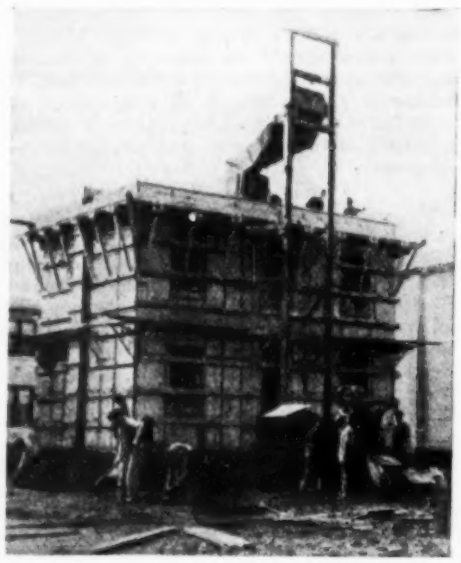


FIG. 7.

liable to become a considerable item if care is not exercised in cutting timber so that it can be used repeatedly on the same job, or of a size that will be useful on other work, systems of metal shuttering have been put on the market. One of the best known of these is the "Metaform" system, of Messrs. A. A. Byrd & Co., of 11, Queen Victoria-street, E.C.4. This is standardised in small units, and is therefore easily applicable to cottage construction. Each unit, from the standard plate, 24 in. by 24 in., down to the smallest, 2 in. by 24 in., and the three types of corner connections, is complete and self-contained. To erect these forms (see Fig. 8) it is necessary to place two plates together and, by raising the malleable-iron clamps (a permanent feature of all plates), lock them rigidly together; true alignment is assured, because all plates and corners fit on to short dowels projecting from the angle-iron edges. Wood strips cut to the exact wall thickness are inserted in the bottom and top of the first course and the two rows of plates facing each other wired tightly on to the wood strip, thus keeping the plates the proper wall thickness apart. For walls up to 2 ft. thick No. 12 S.W.G. wire is used for this purpose. The wires are windlassed tight from the centre, and the first course is then ready for concreting. After the first course has been poured, or while it is being poured, the second course of plates is set on top of the

FIG. 8.

first, and its true position maintained by inserting 4 in. cut nails in the holes in the bottom angles of the second course so that they register into corresponding holes in the top angle of the lower course. The same procedure is again followed for wiring up, but the wood distance strips are only put inside the top of the plates. When ready the first course of plates is stripped by cutting the wire loops and knocking down the clamps, and the plates used for this course are re-set and used again for the third course. Erecting and stripping the forms proceed in this way until the desired height is reached.

A method of building in concrete *in situ* called the "Easiform" system, used by Messrs. John Laing & Son, Ltd., of Carlisle, is as follows: The walls are of 8 in. clinker, mixed wet, and poured between a special shuttering which is the essential feature of the system. The forms are 6 ft. long by 2 ft. high by 3½ in. thick. A row of these is first set in position around the building and filled with concrete. A second row of forms is then placed on the first and filled, after which the first row of forms is taken down and re-erected on top of the second row. Thus two rows of forms are all that are required to erect a wall of any desired height. A system of scaffolding is adopted formed of composite uprights and iron putlogs engaging with the shutters, which enables the lifting of the forms to be carried out without interfering with the construction. As stated, the walls are built of clinker, and therefore porous, concrete, which is finished on the outside with cement roughcast to render it weatherproof. It is claimed that shuttering of this type, carefully and correctly made of well-seasoned timber, will last almost indefinitely.

Fig. 9 shows the method of wall construction known as the "R.C.C." system of the Rogers' Construction Co. (1923), Ltd., of No. 9, Park-place, St. James's-street, Piccadilly, S.W.1. In the section a double sheet of reinforcement is seen running upwards through the wall, and on the faces of the wall are timber sliding shutters. The advantages claimed for this system are the construction of a monolithic wall

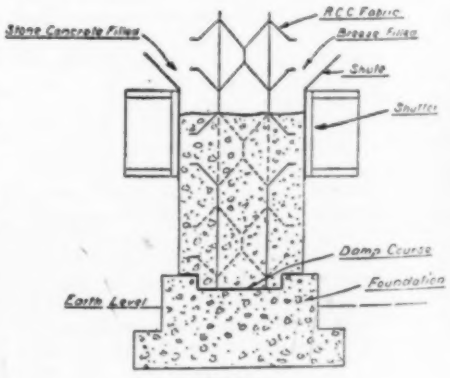


FIG. 9.

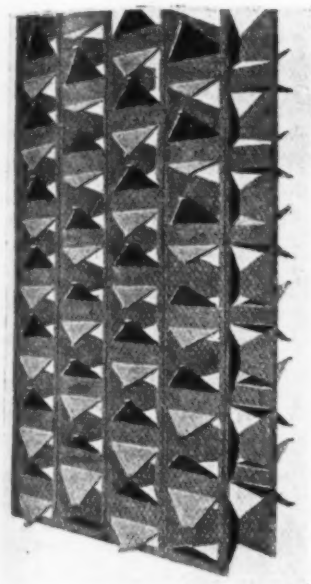


FIG. 10.

with a minimum of shuttering and rapidity of construction. As shown in Fig. 10, the reinforcement consists of sheet steel stamped so that triangular tangs project on each face; two of these sheets are fastened together with wire passed round a number of the tangs projecting inwardly, and the two sheets so fastened together are built into the wall. The use of this reinforcement makes it possible to pour from both sides of the wall simultaneously. The shuttering used is of the sliding type, composed of forms about 15 in. high and of any desired length, usually about 4 ft.

Another type of steel shuttering is the climbing shuttering supplied by the Climbing Steel Shuttering Co., of 515, Queen's-road, Sheffield. This consists of light and bolstered galvanised steel plates, only one row of which is required to build a wall of any thickness and any height. The inside and outside shutters are held apart the thickness of the wall by means of wires which pass through holes pierced in the upper and lower edges of the shutters. When the concrete in the lower course has set the lower wires are cut and the plates turned up from the bottom, the top wires acting as hinges (see Fig. 11). The plates have a face both sides, so that immediately they are turned up and wired they are ready for the next charge of concrete; and so the plates revolve to the top of the wall. No uprights or girders are used except at the corners of the building, where wood uprights are fixed plumb and from these a line keeps the work true. The plates are in lengths of from 5 ft. to 9 ft., and a height of 17 in.

A method of forming walls *in situ*, adopted for some of the houses at Welwyn, and elsewhere, is by the use of a "travelling" mould, that is, a mould usually about 2 ft. 6 in. long by 1 ft. 6 in. high and of a width corresponding to the thickness of the wall to be built. The inner faces of the moulds are usually lined with steel, and oiled to facilitate sliding along the wall as it is formed. The method of construction is to place the mould on the footings at the end of the site of the wall and fill it with concrete. The mould, which has open ends, is then moved along in the direction of the length of the wall for about three-quarters of its length, and again filled, and so on until the bottom course of the wall has been poured. The mould is then released and placed in position on top of the first course at the end of the wall where operations were commenced, and the next course formed. A wall is thus built up in courses to any desired height.

Porous Concrete.

Housing authorities in this country are now taking considerable interest in the porous concrete houses which have been built fairly extensively in Holland, and deputations from Liverpool and other large towns have visited

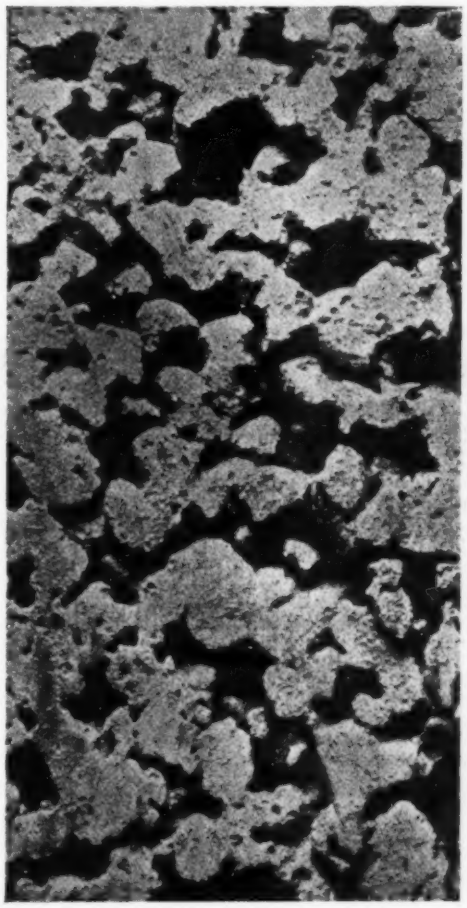


FIG. 12.

Holland to inspect houses built with this material. Fig. 12 shows a section through a block of porous concrete, reproduced actual size. The concrete is made from slag, broken brick, coke breeze, or similar material, mixed with Portland cement in the proportions of 10 to 1. No sand or fine material is used to fill the voids between the coarse aggregate, which is graded to pass a half-inch ring. For floors and roofs the proportions used are 1 part of cement to 3 or 5 parts of porous aggregate, which for these purposes is smaller than a half-inch ring. In this material, the voids equal from 25 per cent. to 50 per cent. of the total volume of concrete, and as these voids or pores are insulated, they make a wall non-conducting of heat and cold and damp-resisting. The outside of the walls is rendered with a 2 in. coating of Portland cement to make them weather-proof, and plastered or wall-boarded internally. For cottages, the walls are usually 12 in. thick for foundations and 8½ in. thick above ground level; 4 in. internal partition walls are generally adopted. The concrete is poured between shuttering. This method of construction is being put on the market in this country by the Corolite Co., of 33, Henrietta-street, London, W.C. 2.

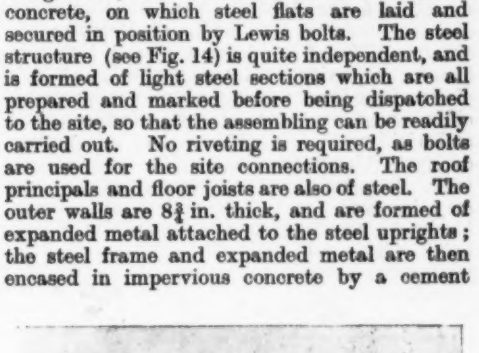


FIG. 13.

Integral Formwork.

There are one or two systems of building monolithic concrete walls by which the shuttering used for pouring the concrete is used as an integral part of the wall, thus eliminating the use of shuttering which has to be taken away after the concrete has set and forms no part of the finished wall. One method is to make concrete tiles, 2 in. thick, by any desired surface measurements, usually about 18 in. × 9 in. These tiles are placed in position to form the inner and outer faces of the wall and held in position by galvanised-iron ties, which are usually left in permanently to strengthen the wall. Between these tiles concrete is poured. The tiles are laid to break joint when superimposed above one another, and are moulded at each edge to form tongue and groove joints. An illustration of a section of this type of walling before the concrete is poured is shown in Fig. 13. Tiles of this type can be formed of impervious concrete for the outer leaf and a porous concrete for the inside.

Steel-Frame and Concrete.

A method of construction designed to avoid some part of the site work is the steel-frame system, the "Dorlonco," of Messrs. Dorman, Long & Co., Ltd. The foundation is formed of concrete, on which steel flats are laid and secured in position by Lewis bolts. The steel structure (see Fig. 14) is quite independent, and is formed of light steel sections which are all prepared and marked before being dispatched to the site, so that the assembling can be readily carried out. No riveting is required, as bolts are used for the site connections. The roof principals and floor joists are also of steel. The outer walls are 8¾ in. thick, and are formed of expanded metal attached to the steel uprights; the steel frame and expanded metal are then encased in impervious concrete by a cement

FIG. 11.

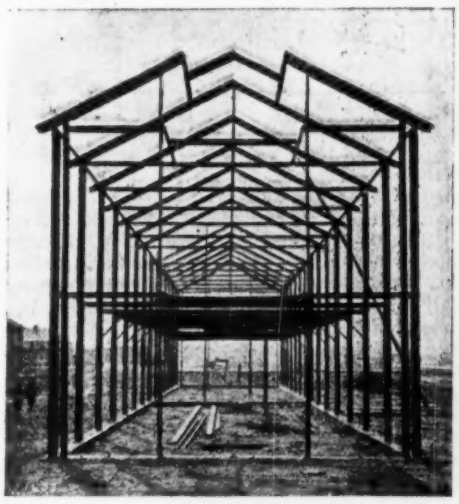


FIG. 14.

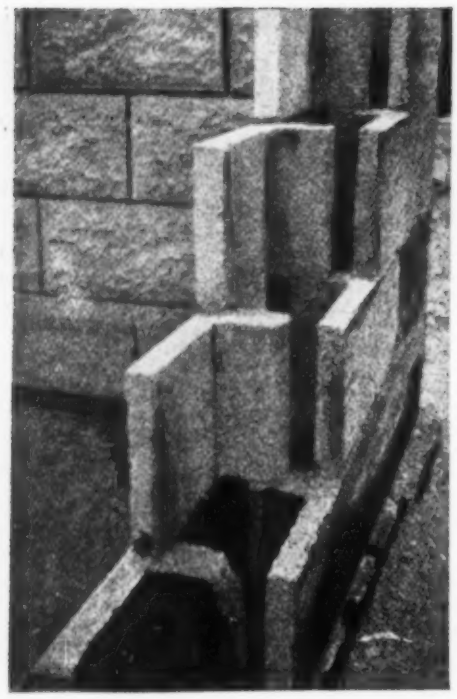


FIG. 15.

gun or other means. Inside this shell an inner wall is built of coke-breeze slabs, with a cavity of 4½ in. The floors are supported on steel transverse beams across which expanded metal is fixed and concreted in the same way as for the outer walls. The roof may also be formed in the same way, covering the concrete with tiles nailed to fillets bedded in breeze concrete. It is claimed that this method of construction is particularly suitable for districts liable to subsidence, as the steel frame binds the structure together as one complete whole, making it practically impossible for any part to sink to a lower level than the remainder of the building.

Concrete Blocks.

A simple type of cavity wall is provided with "T"-blocks, such as that formed by the blocks made on the "Australia" block-making machine of the Australia Concrete Machinery and Engineering Co., Ltd., of Pordon-road, Brixton, S.W. The blocks are so laid that in forming a cavity wall the projecting "T"-pieces of the inner and outer blocks rest on each other, and when grouted together form a sound and rigid wall. By this method a complete cavity wall is obtained, as the "T"-pieces break joint. Impermeable ballast concrete blocks may be used for the outer leaf and porous blocks for the inner leaf. A section of a wall built on this system is shown in Fig. 15.

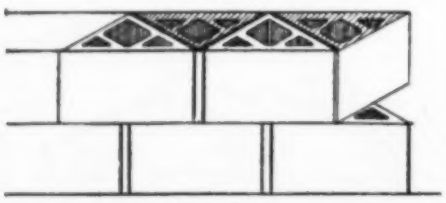


FIG. 16.

In their "Triangular" system of concrete block construction, the Triangular Construction Co., Ltd., of Imber Court, East Molesey, employ units of isosceles triangular shape (see Fig. 16), those on the outside being of a dense, impervious face composed of ballast concrete to withstand the weather, while those on the inner face are of clinker or similar porous concrete, to prevent condensation and for fixing joinery thereto without the use of fillets or plugging. The blocks when built together give a bond of the diagonal type between the two classes of blocks employed, and at the same time the cavities are arranged to register, thus providing continuous vertical cavities. The right angle isosceles triangle has the property that if it is bisected from the apex to the base, two similar triangles are produced, which are each one-half the area of the original. The blocks are therefore made in six sizes, each being half the next size larger, on a system of replica multiples. By this means the half blocks necessary for bonding, the formation of angles and corners, &c., are all provided without the necessity of cutting or making special blocks. Each standard block forms a wall of its own, yet by the use of the multiples an almost infinite variation in design can be carried out.

The centrifugal process of consolidating concrete has been applied to cottage construction by Messrs. Centrifugal Concrete Products, Ltd., of Oakengates, Salop. A section of walling built on this system is shown in Fig. 17. By the centrifugal process a very dense concrete is obtained, and all superfluous water and air-pockets are dispersed; the process is now being extensively used for the manufacture of water-pipes and sewer tubes, in which an impermeable concrete is essential. In making blocks the centrifugal principle is taken advantage of to

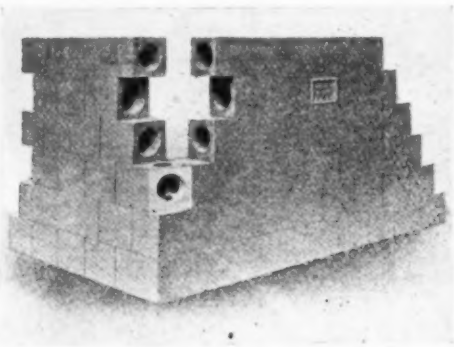


FIG. 17.

form the cavity automatically, its size being determined by the amount of concrete put into the mould. These blocks may be made to any desired size, and used in the same way as other types of concrete blocks.

Two types of blocks used by the British Lèan Co., Ltd., proprietors of the "Lèan" system of concrete block construction, are illustrated in Fig. 18. The "Lèan" block is rectangular in form and has two or three parallel longitudinal cavities; ducts are formed in the ends in order to avoid solid thicknesses of walling at the points where the blocks are joined.

"Gunite."

A method of wall and floor construction which has been used to some extent in this

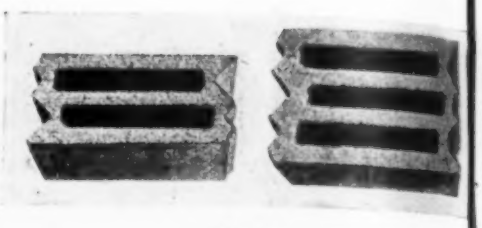


FIG. 18.

country, and to a greater extent in the United States, is formed of a covering of concrete applied to a mesh-like reinforcement. This type of reinforcement is supplied by several firms, such as the Trussed Concrete Steel Co., Ltd., of 22, Cranley Gardens, S.W.7 ("Hyrib," see Fig. 19), the Expanded Metal Co., Ltd., of York Mansion, Petty France, S.W.1, whose expanded metal reinforcement is shown in use

FIG. 19.

in a pair of cottages in Fig. 20, and the Self-Sentering Expanded Metal Co., Ltd., of 110, Cannon-street, E.C.4, who supply "Self-Sentering," a portion of a sheet of which is shown in Fig. 21. The method of construction is to erect the sheets of reinforcement on a timber framework and cover them with concrete by a cement-gun or other more usual methods.

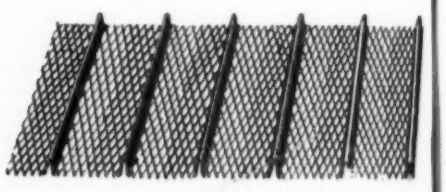


FIG. 21.

These sheets of reinforcement are specially made to give a good key to the concrete, and the method permits of considerable rapidity of erection without the use of skilled labour.

Large Pre-cast Units.

Commander Burney's system of mass production by standardised units has received a great

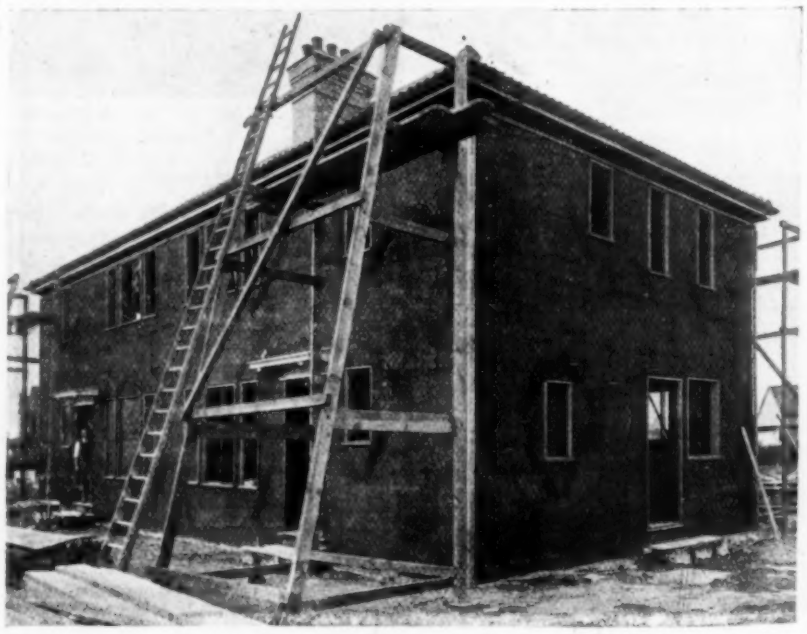


FIG. 20.

deal of publicity in the Press. Standardised units, whether blocks, piers and panels, or the whole sides of houses, are an essential feature of the majority of the new methods now advocated, but the most novel feature of the "Burney" system is the material used. This is called "Factocrete," a composition of cement and sawdust or similar material which keeps the units so light that the cost of transport is reduced to a minimum, an important point when the units are made in a factory which may be a considerable distance from the site. Great pressure is applied during manufacture, and the material can be sawn or drilled and the surface finished like wood. Two types of "Factocrete" are used, a hard and impervious quality for outer walls and roofs, and a softer type, resembling wood, for floors, wall-linings and ceilings. The material is delivered on the site in sections the full height of a story, either plain for parts of the wall where there are no openings, or with window and door openings where required; the design is so standardised that the windows and doors are of the same width as the units, which are about 2 ft. 9 in. wide. A standard wall section is shown in Fig. 22, to the inner face of

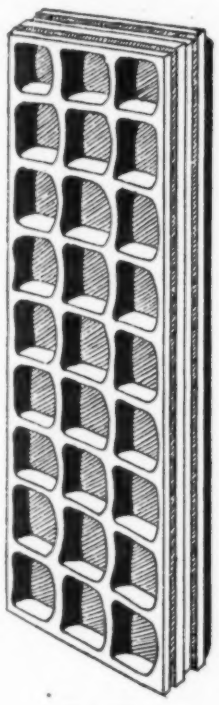


FIG. 22.

which the wall-lining is fixed. The sections are bolted together, as shown in the longitudinal section in Fig. 23.

Another method of using large pre-cast units has been patented and is in use by Messrs. John Wallis & Co., of West Hyde, Rickmansworth. Slabs of concrete to the full height of a story to any desired width to suit the design are cast in frames of 3 in. by 4 in. oak jointed by mortice and tenon, with the outer edges lap-rebated so that the frames may be jointed to each other when erected in position. These frames are made on the site or in a factory, and when erected give a half-timbered effect, as is shown in Fig. 24. If smaller panels are required a framing of oak is fixed inside the frame. In casting the slabs a layer of flints or other stone may be pressed into the face so that they give an interesting surface, or the panels may be cast face down by first placing a layer of flints, pea-shingle, or other suitable stone in the bottom of the mould and then filling in the backing of concrete. The panels are bolted together in a mastic composition, and the timber oiled to

FIG. 23.

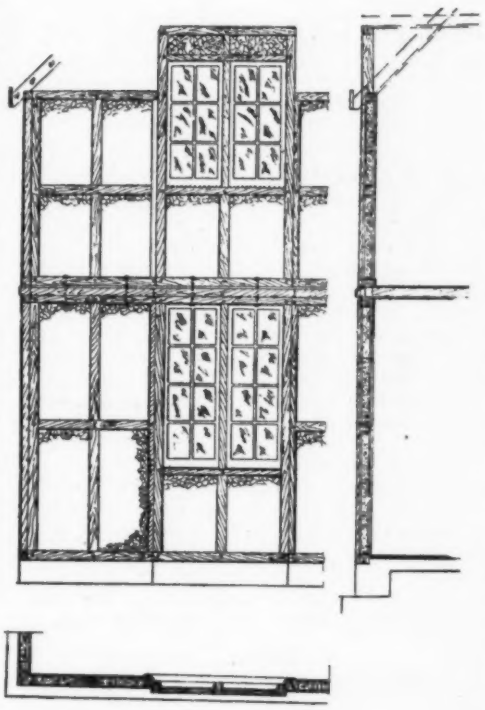


FIG. 24.

preserve it. A cavity wall is formed by fixing wall-board to the inside of the framing.

Methods have also been used by which the whole sides of houses have been cast in a horizontal position near the site and hoisted upright and bolted together after the concrete has set.

Timber-Frame and Asbestos Cement Sheets.

A light type of construction often used for bungalow construction is formed of asbestos-cement sheets between a timber framing. In the "Doric" system of the Modern Building Co., of Central Chambers, North-street Quadrant, Brighton, a concrete foundation is first laid over the site, and a base wall of brick to the floor level. On these footings a carcass superstructure of 4 in. by 2 in. mortised and tenoned timber is erected. Between the timber framing are fixed weatherproof asbestos-cement sheets rough-cast on the outside, and stained asbestos-cement sheets are used for the interior. Solid walls may also be used with this system by pouring concrete between the sheets, which then act as shuttering and also as the faces of the finished wall.

In this review no attempt has been made to describe every system on the market, but by giving brief details of some representative systems of various types of construction to give an idea of the lines on which new methods of cottage construction are now being developed.

NEW BUILDINGS IN LONDON

Regent-street.—Work will be put in hand this year on the rebuilding of the large corner premises at 113, Regent-street, W.1, owned by Messrs. Austin Reed, Ltd., outfitters. The new building will be of six floors with large basements, and will be of steel-frame construction with two street elevations in Portland stone. These elevations will be enriched with bronze ornaments and railings, stone carvings, cornices, &c., whilst the shop windows will be of metal and plate glass. The woodwork and joinery of the shop and showrooms will be in light oak, highly polished, with electric lighting effects for the display fronts and the interior. Central heating will be installed throughout the entire building, and there will also be a lift installation. The window sashes on the upper stories will be of steel. The staircases and landings will be fireproof, of reinforced concrete. The basement will be used for storage and will house the central heating boilers, coal, &c. A mansard roof will be set back from the main cornice of the front. The floors will all be of fireproof design. The architects are Messrs. P. J. Westwood & Emberton, of 7, Adam-street, Strand, W.C.

Moorgate.—The Ocean Accident & Guarantee Corporation, Ltd., are to erect new head offices in Moorgate, London, E.C.2. Their present premises have now been demolished by Messrs. H. Sabey & Co., Ltd., of 7, South Wharf, Paddington, W.2, and the work of constructing the foundations for the new building is shortly to start. The accommodation to be provided will include general offices, secretary's and general manager's offices, chairman's and managing director's rooms, boardroom, storage rooms, staff recreation and dining rooms, kitchens, &c. There will be six stories in all, with a basement and sub-basement. The strong rooms will be below street level. A steel frame will support the building, and the front elevation will be in Portland stone, the rear being of white glazed bricks. There will be a tiled roof with fire escape staircases. The floors will be of reinforced concrete. Heating and ventilating systems, electric lighting, vacuum cleaning apparatus, and a lift will be part of the equipment of the building. The interior decoration will be carried out in marble for stairs and skirtings, polished and fibrous plaster, and art metal work. The woodwork will be in oak and mahogany, &c. The windows will all be of the steel casement type. A contract for the building has been placed with Messrs. Leslie & Co., Ltd., of Kensington-square, London, W.8. The plans have been prepared by Sir Aston Webb & Son, of 19, Queen Anne's Gate, Westminster, London, S.W.1. Mr. B. L. Hurst, Craig's Court House, Whitehall, London, S.W.1, is the consulting engineer for the steel-work, reinforced concrete work, &c.

St. James'.—A large building is to be added to the Wellington Barracks, in Birdcage Walk, Westminster, S.W.1, for use as an officers' mess. The block will be five stories in height and will accommodate mess and ante-rooms, reading rooms, billiard rooms, kitchens, stores, servants' quarters, &c. It will be constructed of brick to match the existing barracks and will be of steel frame construction. The roof will be flat and of asphalte covering concrete, reinforced with steel mesh. Stone dressings will relieve the principal elevations, being used for windows and main doorway. Heating and lighting devices will be installed, and the kitchens will be equipped with extensive plant. There will be a cold store. The contractors are Messrs. W. H. Gaze & Sons, Ltd., of 23, High-street, Kingston-on-Thames, Surrey. The plans have been prepared by the Royal Engineers, at 2, Duke-street, Adelphi, W.C.2.

Threadneedle-street.—Demolition work is practically completed on the site of the second portion of the premises in Threadneedle-street, E.C., of the Westminster Bank, Ltd. The site has a frontage of about 90 ft., and extends back to the new buildings in Old Broad-street now being erected for Messrs. Layard Bros. & Co., Ltd., The building will be five stories in height with two basements, reaching a depth below pavement level of 25 ft. The ground floor will comprise the principal entrance and lobby, with access to three passenger lifts, and a main banking hall. The hall will have a height to ceiling of about 20 ft. and will be finished in polished plaster with marble panelling and skirtings. The four upper floors will be used as offices and will include lavatories, &c., on each floor. The top story will be continued in a mansard roof, set back slightly from the main front. All the floors will be of hollow tiles, reinforced with steel rods. The street elevation will be in Portland stone. The roof will be of red tiles, hand-made, with asphalte top. The interior work includes office and bank fittings in various hardwoods, heating and hot-water systems, electric lighting, &c. The contractors are Messrs. Holloway Bros. (London), Ltd., Bridge Wharf, Grosvenor-road, London, S.W.1. The architects are Messrs. Mewes & Davis, of 22, Conduit-street, W.1.

THE STORAGE OF ELECTRICAL ENERGY

By RONALD GRIERSON, A.M.I.E.E., A.M.I.Mech.E.,

Author of "Some Modern Methods of Ventilation," "Electric Lift Equipment for Modern Buildings," etc.

Due to the extensive use of electrical energy for country house, yacht and car lighting, and for heating the filaments of Broadcast receiver valves, it is possible that many non-electrical readers may welcome a few notes dealing with the principles underlying the design and construction of the common type of storage cell. Unfortunately for all users of electrical energy, no one has yet discovered a practical method of storage that can be favourably compared with the gas-holder, employed at practically every place where gas is manufactured.

Due to the habits of consumers of electrical energy, there are periods when the demand on the generating plant is very heavy, and again there are periods (*e.g.*, between midnight and early morning) when it is relatively light. The capital charges on the machinery (boilers, turbines, generators and switchgear) and on the distributing and service cables accrues regularly, however, hour by hour throughout the eight thousand, seven hundred and sixty hours of the year, and the consumer must pay his share of these charges, whether he is or is not using the plant.

Obviously, if the plant installed could be operated at its maximum safe load throughout every hour of the year, or even of the week, and the surplus could be discharged into a reservoir at times of light load and be efficiently recovered during periods of heavy load, then it is clear that the capacity of the generating plant installed could be considerably smaller than would otherwise be necessary, due to the assistance that it would receive from the storage device during the period of heavy demand. It immediately follows that if the interest and maintenance charges on the storage device are sufficiently low, the installation of such a device would favourably re-act on the total cost of production, due to the reduced capital charges on the smaller plant installed.

Apart from this aspect of the subject, the advantages to be derived from an invention, whereby electrical energy could be easily, efficiently and economically stored and transported in a small, light and portable container, for use on cars, railway carriages, launches, and other purposes, are too obvious to call for further elaboration.

Types of Storage Devices.

Although during the last half century many people have devoted much time and thought to the problem outlined above, only one direct method of storing or accumulating electrical energy has been evolved, *e.g.*, the static condenser or Leyden Jar in one of its modified forms.

Storage devices of this type consist of pairs of thin metal plates, separated by thin leaves of insulating material such as mica, glass or unglazed material impregnated with paraffin wax. Such condensers or storage devices have only a limited use at present, and are only employed in connection with wireless transmission and receiving equipment, telephony and telegraphy, X-ray coils, and for certain purposes in connection with a technical detail of alternating current supply and distribution. The only practicable method of storing electrical energy in a form suitable for use in lamps, radiators and motors available to us at present is the chemical cell or group of cells termed, collectively, a battery (*e.g.*, a battery of cells).

Contrary to the opinion generally held, the chemical cell does not, strictly speaking, store electrical energy. What actually happens is that during the so-called process of charging or "filling" the cell with electrical energy, a chemical change in the constituent parts of the cell takes place. When this charge is complete, the process can be reversed, *e.g.*, if the terminals of the cell be joined by a wire, having a suitable resistance, a current of electricity will flow through the wire, and, after a certain period of time, the chemical condition of the cell will be similar to that which first existed, *e.g.*, before the filling or charging process commenced. The process of charging and discharging the cell is termed a cycle, and the total life of the cell, providing it is properly cared for, is based upon the number of cycles it can be put through before the efficiency falls below the economical limit.

Lead Storage Cells.

The type of cell most commonly used comprises a celluloid, glass or lead-lined wood container, a quantity of liquid termed the electrolyte, and the positive and negative lead plates. Glass, wood, or celluloid separators are also provided to prevent electrical contact between the lead plates that are suspended in the electrolyte.

Plates.

The plates consist of thin slabs or plates of lead, and are of two kinds, *e.g.*, the positive and the negative. The positive plates, when in good condition are invariably chocolate brown in colour, and are frequently slightly thicker than the negative plates. In cells containing more than two plates, the negative group contains one plate more than the positive group, *e.g.*, the positive plates each have a negative plate on each side of them.

The colour of the positive plate is due to the fact that in the process of formation or manufacture the metallic lead plate has been converted into the chemical compound termed lead peroxide, which is a fairly hard but brittle substance. Its chemical formula is PbO_2, *e.g.*, the molecule contains one atom of lead in combination with two atoms of oxygen. Negative plates, when in good condition, are a light slate grey in colour, and consist of pure lead in a spongy or porous state, which is remarkably tough.

The two principal inventions made in connection with the lead-sulphuric acid type of storage batteries were discovered by Planté and Faure, but much work has been done on the subject subsequently by various investigators. At the present time practically all makers use a modified form of the Planté plate for the positive element, and of the Faure plate for the negative element. In the former the lead oxide consists of a thin layer or skin formed on the surface of the lead, and the problem, therefore, before the designer is to provide the maximum surface for a given cubic space. Practical solutions adopted by different makers include the laminating or grooving of the plate and also the use of corrugated or grouped lead strip, rolled into rosettes and inserted in holes cast in the pure lead plates, the rosettes being riveted in position.

Fortunately, the spongy metallic lead, that forms the negative element of the cell, is tough and undergoes comparatively little change of physical volume during the process of charge and discharge. The majority, therefore, of negative plates consist of perforated or grooved lead plates filled with a paste of the spongy lead. Alternatively they may be formed of two thin perforated lead plates, riveted together to form a box or envelope which carries moulded flat square pellets.

The Electrolyte.

Pure sulphuric acid (oil of vitriol) has a specific gravity or density of 1.840.* This is very much too strong for use in the cells, and before use it must be diluted with water. The actual strength of the liquid or electrolyte is of considerable importance, since if the degree of concentration is too high the resistance to the passage of the current is also high, and the acid will attack the lead plates. Conversely, if the acid is too weak, it has a deleterious effect on the plates.

Normally, the density or specific gravity of the acid in the fully charged cell is 1215, or occasionally 1225, but when the space available for the acid is limited by considerations of size and weight (*e.g.*, portable, vehicle and submarine cells) it may be considerably higher—in some types as high as 1275 or 1285. (Note.—Density is usually referred to as "twelve twenty," not one thousand two hundred and twenty.)

Electrolyte of the correct density can be obtained from any of the usual suppliers, but should, for any reason, it be found necessary to dilute or break down strong acid the operation should be performed with the greatest care. Sulphuric acid has a great affinity for water and considerable heat is given up in the process. The acid must be added to the water in very small quantities and well stirred, and without producing splashes. (Acid splashes are, of course, injurious to the skin and will burn holes in clothing, rugs, or carpets.)

Chemical Changes in the Cell.

If the two elements (*e.g.*, the positive and negative plates) of a fully charged cell are converted by a wire, having a resistance of two or three ohms, a current of electricity will flow in the wire and may be detected by the usual means. As the discharge proceeds, the positive plate which carries the active lead oxide (PbO_2) gives up its oxygen (O_2), and the pure lead (Pb) remaining enters into combination with the sulphur compound (SO_4) of the acid (H_2SO_4) to form lead sulphate ($PbSO_4$). At the same time the spongy lead (Pb) carried by the negative plate similarly enters into combination with the sulphur compound (SO_4) of the acid (H_2SO_4) and forms lead sulphate ($PbSO_4$.) The hydrogen (H_2) of the acid (H_2SO_4) released by the sulphur compound (SO_4) enters into partnership with the oxygen (O) released from the positive plate (PbO_2) to form water (H_2O), and this, of course, still further tends to dilute the acid, *e.g.*, to reduce its density.

Obviously, if the process be continued, the ultimate result would be that both the positive and the negative plates would be converted into lead sulphate ($PbSO_4$), and the liquid or electrolyte would be reduced to pure water. If this state were reached the electrical pressure previously existing between the elements would be reduced to zero.

In actual practice the discharge is stopped long before this condition is arrived at. Actually, at the time when the discharge is stopped the active material on the positive plate consists of an intimate mixture of lead peroxide (PbO_2) and lead sulphate ($PbSO_4$), and on the negative plate of a mixture of spongy metallic lead (Pb) and lead sulphate ($PbSO_4$).

If, when the cell is in this condition, the terminals be connected to a suitable source of direct current supply, the current will be forced through the cell in the opposite direction, the result being that the sulphate will return into the electrolyte, e.g., the sulphated negative plate will be reduced to spongy lead and the sulphated positive will yield up its sulphur compound and take up two atoms of oxygen in place of it.

It may be convenient to observe here that there are two quite distinct grades or states of sulphation, *e.g.*, normal and abnormal. The first type, *e.g.*, that dealt with in the preceding paragraphs, is removed during the period of charge, if this follows the discharge within a short period. Conversely, if the battery is not worked sufficiently, especially if new, or if the battery is not charged sufficiently (*e.g.*, if the sulphate formed on the plates during the normal discharge, is not entirely driven back into the acid during the charging period) abnormal sulphating results. The symptoms of this disease are that the plates become light in colour; white spots develop which rapidly spread into patches; the plates feel hard and

* Specific gravity is the weight of a definite volume as compared with an equal volume of water, which is taken as a standard or 1·000.

metallic, and lose their porosity, and hence their capacity to hold their charge, since capacity depends on porosity.

To summarise the whole process of charge and discharge and sulphation in a few words, it may be said that the former consists in the forcible ejection of the sulphur molecule from the plates into the electrolyte, and the process of discharge into the movement of sulphur molecule from the electrolyte into the plates. As in other phases of life, if the visitor is allowed to overstay his welcome he becomes a nuisance; if not a positive menace to the happiness of his host and hostess. For the well-being of all concerned it is obvious that if and when this situation arises, immediate steps should be taken to eject him forcibly into the street, *e.g.*, into the electrolyte in this case.

Terminal Polarity.

Occasionally, confusion arises regarding the polarity of the terminals of a cell or battery of cells considered in relation to discharge and charge. In every instance the chocolate-coloured plate is the positive, and the terminal is usually painted red, while the negative is slate grey and the terminal is painted black or blue.

If a moving coil ammeter is inserted permanently in the circuit it should be of the type known as " centre zero," *e.g.*, it should have the zero point at or about the centre of the scale, so that discharge readings may be taken on one side and charge readings on the other side of the zero point. Although the current may be said to flow out by the positive terminal on discharge and in by the same route on charge, the polarity does not change. It remains the positive terminal throughout the cycle.

Cell Capacity.

The capacity of a secondary cell is measured and calculated in ampere hours, *e.g.*, it is based upon the electrical current it will cause to flow constantly through a given circuit for a given number of hours. In other words, the capacity of a cell is the multiple of two units, the one being time (hours) and the other the rate of current flow (amperes). Theoretically (neglecting efficiency), a cell having a capacity of 100 ampere hours would furnish a current of one ampere throughout a run of 100 hours, or, alternatively, a current of 100 amperes throughout a run of one hour. For a given type of cell, the capacity is proportional to the size and to the number of plates contained in each element of the cell.

Positive plates of the Planté type will furnish from 5 to 8½ ampere hours per pound weight of plate. Similarly, negative plates of the Faure type will furnish from 12 to 50 ampere hours per pound weight. The higher capacities relate to plates used for portable cells in which a high ratio of capacity to weight is essential, and long life is a secondary consideration. For stationary batteries, when weight is relatively unimportant and long life is the essential factor, the lower ratios apply.

Electrical Characteristics.

The voltage or electrical pressure developed between the positive and negative terminals of a charged or discharged cell when tested on open circuit, *e.g.*, when the cell is neither charging nor discharging, lies between 2.08 and 2.1 volts, and no variation in the size or the number of plates in the cell will affect this value. It may, however, be affected by the specific gravity of the electrolyte and by the temperature of the battery room. Immediately after the completion of the charge, the cell voltage stands abnormally high, *e.g.*, at approximately 2.26 volts. If left on open circuit, the voltage will not drop to the normal value for several hours.

Care should, therefore, be taken when switching on a newly charged battery to see that the pressure-regulating device is correctly adjusted, otherwise excessive current will be forced through the lamps or other consuming devices, with the risk of failure. If only a very slight discharge current is allowed to flow this abnormal voltage disappears in a few minutes.

On continuous discharge, at a fairly low rate, the pressure drop is only slight and gradual during the earlier part of the discharge, but increases rapidly towards the end of the period. The final value reached depends on the area of the plates and the length of time during which the discharge takes place.

On the more usual seven and ten-hour periods the final voltage is approximately 1.82/1.85 or approximately 0.2 volts, *e.g.*, 10 per cent. drop. Typical discharge voltages for the 1, 3, 5, 7 and 10-hour rates are given in the following table:—

TYPICAL DISCHARGE VOLTAGES AT DIFFERENT RATES.

[Plates up to 400 sq. in.]

Duration of Discharge.	Period of Discharge in Hours. 0	1	2	3	4	5	6	7	8	9	10
1	2·02	1·75	—	—	—	—	—	—	—	—	—
3	2·02	1·92	1·89	1·80	—	—	—	—	—	—	—
5	2·02	1·95	1·94	1·93	1·90	1·82	—	—	—	—	—
7	2·02	1·97	1·97	1·96	1·95	1·93	1·90	1·83	—	—	—
10	2·02	2·00	2·00	2·00	1·99	1·98	1·97	1·96	1·95	1·92	1·85

Conversely, during the period of charge, the pressure rises rapidly at first from the open circuit value of 2.02 to about 2.15, then very gradually to about 2.28 or 2.30, and rapidly again to 2.65 to 2.70, when it remains practically constant. At this point practically the whole of the sulphate has been driven from the plates back into the electrolyte which is within two or three points of the maximum density. If the charge is allowed to continue, the water added to the acid to dilute it is split up into its constituent parts—hydrogen and oxygen—visible as an evolution of countless gas bubbles which give the electrolyte an appearance of boiling or being milky. If carried to excess there is considerable waste of current, that has to be paid for, and, under certain circumstances it is positively detrimental to the plates. During the period of " gassing " or " boiling," under no circumstances should a naked light be taken into a battery room or put near the vent of a portable cell, since there is a very considerable danger of explosion. Hence also battery rooms should be well ventilated.

Specific Gravity.

As previously indicated, the specific gravity of the electrolyte also undergoes a change during both the charge and discharge process, the variation being normally between the limits of 1150 and 1220, or approximately 50 points.

The temperature at which the specific gravity is taken is important since, if the temperature of the electrolyte rises, the volume increases, but the weight of sulphuric acid remains constant. Hence the specific gravity falls. The converse obviously holds good. The amount of variation is approximately one degree of density for each 2½ degs. Fahr. temperature variation. Taking an extreme case, for example, if the specific gravity of a fully charged battery is 1220 at 60 degs. Fahr., should the temperature fall to 30 degs. Fahr., although the battery would be fully charged, the hydrometer would read 1231, and discharge should be stopped at 1181—not 1170.

With a constant rate of charge, the specific gravity approaches a straight line, but again, unfortunately, there is a slight variation due to the time that is required for the sulphate, that is released in the pores of the plate, to diffuse into the general body of the liquid. Consequently, after the charge is stopped, there is usually a further rise of five to ten points in the specific gravity, due to the cause indicated.

Read in conjunction with each other, and with due regard to the temperature at which the readings are taken, the records of voltage and specific gravity form a very useful indication of the condition, *e.g.*, the state of discharge or charge of the cell.

Ratio of Plate to Electrolyte.

Consideration of the preceding paragraphs will clearly indicate that the cubic capacity of the container or box must bear some definite relation to the weight of active material in the plates, for otherwise the variation in the specific gravity during charge and discharge will be seriously affected. This point explains the reluctance of the battery-makers to agree to proposals to instal large cells in combination with a small number of plates in the first instance, the intention being to facilitate an increase in the capacity of the battery at a later date.

TIME CAPACITY TABLE.

[400–600 sq. in. Plate Area.]

Duration of Discharge	10	9	8	7	6	5	4	3	2	1
Per cent. capacity	100	98	95	92	88	83	78	72	63	50
Approximate Final voltage	1·84	1·84	1·84	1·83	1·83	1·82	1·81	1·80	1·78	1·75

Discharge Rates and the Effect on Capacity.

A storage cell can be discharged at a relatively low rate for a long period, or at a high rate for a short period. Considered purely from the point of figures, it would appear possible to discharge a 1,000 ampere hour cell in one hour at the rate of 1,000 amperes, or in ten hours at the rate of 100 amperes per hour.

Actually, the discharge capacity of a cell is not constant at different rates of discharge. With an increase in the rate the capacity of the battery is diminished, and therefore in specifying the capacity of a cell the discharge period must also be specified.

Small batteries, comprising two or three cells, are occasionally sold on the " ignition rate " basis, which means that their capacity is practically 50 per cent. of the actual rate based on a ten hour discharge period.

Unless otherwise specified the capacity of a cell is normally rated on the ten hour discharge basis.

The reasons for the variation in the capacity at varying rates of discharge are as follows:—

(*a*) The limitation in the final voltage per cell. Obviously it is useless working a cell after the voltage has fallen below a useful minimum value, and this is affected by the rate at which the spent acid in contact with the plates can be replaced by fresh, strong acid by the process of diffusion.

(*b*) The rise of the internal resistance of the cell, which is directly proportional to the increase in the rate of discharge.

Efficiency.

Efficiency is the ratio of output to input, and can either be figured in ampere or watt hours.

To maintain the battery in a healthy condition over a given period, 100 ampere hours must be put in for every 85 to 88 ampere hours taken out, depending on the size and the age of the battery.

The watt hour efficiency is usually of more importance if the battery is considered from the economic point of view. Under ordinary working conditions this value is of the order of 70 to 78 per cent. The value for watt hours per cell on discharge or charge is obtained by multiplying the ampere hours by the average volts per cell.

STRUCTURAL DESIGN*

THE author has selected six large structural members in steelwork, and given the calculations and details so that they may satisfy the requirements of the authorities appointed under the several Building Acts. In the selection of these examples the primary object aimed at is to give examples of problems not dealt with in ordinary text books. Such is in substance the claim made in the preface, and we look for some of these examples. Appendix III contains such a case. On page 58, the last paragraph but one, the author writes:—". . . it will be desirable to deduce similar arithmetical formulæ for the important case which practically all text-books ignore, viz., the deflection due to a point load which is not at the centre of the span."

A well-known text book—one might almost say the standard—is Dr. Morley's "Theory of Structures," and on page 206 of the edition published in 1912, Article 96 is devoted to the case of "a simply supported beam with non-central load," with a sub-section dealing with the same case but with several concentrated loads all non-central, and the deflection at any selected point whether under a load or not is dealt with. Again, on page 236, in Article 103, the same problems are dealt with for the case of beams whose ends are fixed, together with the treatment of beams with ends free or fixed for any kind of loading. Article 104 extends the problem to that of beams continuous with any number of props with any loading. In Article 106 beams of varying section are considered; it would, therefore, appear that a solution was available to the author to the problem he proposed no less than 12 years ago, and one that in many ways is preferable to the author's method. Prof. Perry has dealt with the same problems in his "Applied Mechanics," published in 1897, in Chapter 20. Again Mr. E. S. Andrews, in "The Theory and Design of Structures," published in 1908, has also dealt with it.

In Chapter VI, which deals with a wall stanchion carrying main floor girders, there is a statement made that the stresses in the stanchion due to its attachment rigidly at its upper end are usually neglected, is followed by an examination based upon the principle "that connected members share any joint loading in proportion to their stiffness is believed to be novel." The principles were laid down in the first place by Prof. Clerk Maxwell, and developed by later writers and recently summed up by Prof. Lamb in a paper published a few months since by the Institute of Civil Engineers, London. The problem the author attacks is dealt with by Dr. Morley in his "Theory of Structures," There indeterminate combinations, including portals, are dealt with. Mr. E. S. Andrews has also treated the same subject. Apart from these and other claims for originality in treatment, no doubt students, draughtsmen and others will find much that is interesting and valuable in a study of the designs published. The publishers have done their work well, the diagrams being well reproduced and the type generally is very clear.

THACKER'S CALCULATOR†

THIS is a table giving the cubic content of timber, or other materials, whose cross-sections are rectangular, per foot run in cubic feet, for all dimensions between 2 in. and 12 in., advancing ¼ in. Thus, given two purlins each 11 ft. long and 5 in. by 7 in. From the table for 5 in. by 7 in., we find the number 0.243, hence the content required = 2 by 11 by 0.243=5.346 cub. ft. The values given in the tables are to three significant figures, and appear to be correct, but the results are not necessarily correct to the same extent. For in the example cited the true content is

$= \frac{5}{12}$ by $\frac{7}{12}$ by 11 by 2 = 5.347 cub. ft.

The error is very small, but users of these tables frequently imagine the results obtained by their means to be absolutely accurate.

*"Structural Design in Steel Frame Buildings. By Percy J. Waldram. (London: Batsford) 12s. 6d. net.

†"Thacker's Cubic Calculator." By H. S. Bonsor, A.S.E. (London: W. Thacker & Co.) Price 2s. 6d.

RATES OF WAGES IN THE BUILDING TRADE

Every endeavour is made to ensure accuracy, but we cannot be responsible for errors.

	Masons.	Brick-layers.	C p'ters. Joiners.	Plas-terers.	Slaters.	Plum-bers.	Painters.	Labourers.
Aberdare	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Accrington	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Altrincham	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Ashton-under-Lyne	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Barnsley	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Barrow-in-Furness	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Barry	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Bath	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Beaufort	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Birkenhead	1/9	1/9	1/8½	1/9	1/9	1/9	1/8½	1/4
Birmingham	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Bishop Auckland	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Blackburn	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Blackpool	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Bolton	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Bournemouth	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Bradford	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Brentwood	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Bridgwater	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/1
Brighton	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Bristol	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Burnley	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Burton-on-Trent	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Bury	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Cambridge	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Cardiff	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Chatham	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Chelmsford	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Cheltenham	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Chester	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Chesterfield	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Colchester	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Coventry	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Crewe	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Darlington	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Derby	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Doncaster	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Dudley	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Durham	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
E. Glam.(Mon. Vall.)	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Eastbourne	1/5	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Exeter	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Folkestone	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Gloucester	1/6	1/6	1/6	1/6	1/6	1/6	1/5	1/1½
Grantham	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Grays	1/8½	1/8½	1/8½	1/8½	1/8½	1/8½	1/7½	1/3½
Grimsby	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Great Yarmouth	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/1
Guildford	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Halifax	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Harrogate	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Hartlepools	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Hastings	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Hereford	1/6	1/6	1/6	1/6	1/6	1/6	1/5	1/1½
Huddersfield	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Hull	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Ipswich	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Lancaster	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Leamington Spa	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Leeds	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Leicester	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Lichfield	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Lincoln	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Liverpool	1/9	1/9	1/8½	1/9	1/9	1/9	1/8½	1/4
Llanelly	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
London {12 m. radius	1/9½	1/9½	1/9½	1/9½	1/9½	1/9½	1/8½	1/4½
London {12-.5 m. radius	1/9	1/9	1/9	1/9	1/9	1/9	1/8	1/4
Loughborough	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Luton	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Maidstone	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Manchester	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Mansfield	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Merthyr Tydfil	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Middlesbrough	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Newcastle-on-Tyne	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Newport, Mon.	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Northampton	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Norwich	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Nottingham	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Oakham	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Oldham	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Oxford	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Plymouth	1/8	1/8	1/8	1/8	1/8	1/8	1/7	1/3½
Pontypridd	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Portsmouth	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Preston	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Reading	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Rochdale	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Rochester	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Rugby	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
St. Albans	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
St. Helens	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Scarborough	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Sheffield	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Shrewsbury	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Southampton	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Southend-on-Sea	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Southport	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
South Shields	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Stockport	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Stockton-on-Tees	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Stoke-on-Trent	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Stroud	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5	1/1½
Sunderland	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Swansea	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Swindon	1/6	1/6	1/6	1/6	1/6	1/6	1/5	1/1½
Taunton	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/2½
Torquay	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/1½
Tunbridge Wells	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/3½
Wakefield	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/2½
Walsall	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/3½
Warrington	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
West Bromwich	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Wigan	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Windsor	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Wolverhampton	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½
Worcester	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
York	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½

(For rates of wages in the Building Trade in Scotland, see page 93.)

CONTRACTS, COMPETITIONS, &c.

For some contracts still open, but not included in this List, see previous issues. Those with an asterisk are advertised in this number. Certain conditions beyond those given in the following information are imposed in some cases, such as that advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed; that no allowance will be made for tenders: and that deposits are returned on receipt of a bona-fide tender unless stated to the contrary.

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders, may be sent in; the name and address at the end is the person from whom or place where quantities, forms of tender, &c., may be obtained.

BUILDING AND PAINTING.

JANUARY 12.—**Barnsley.**—BUNGALOW.—For trades for erection and completion of a bungalow, Mount Vernon-road, for Mr. J. Wildsmith. Messrs. Dyson, Cawthorne & Coles, architects, 10, Regent-street.

JANUARY 12.—**Birmingham.**—ADDITIONS.—For building alterations and additions at Dudley-road Hospital, for the B.G. Mr. J. Curtis, Clerk to the Guardians, Union Offices, Edmund-street. Deposit £10 10s.

JANUARY 12.—**Blackpool.**—PAINTING.—For interior painting, &c., of the Art Gallery, Queen-street, for the C.B. Mr. F. Wood, Borough Engineer and Surveyor, Municipal Buildings, Town Hall-street.

JANUARY 12.—**Bognor.**—COTTAGES.—Erection of 24 cottages on the housing site off Sheepwash-lane, for the Bognor Urban District Council. The Surveyor, High-street, Bognor. Deposit £2 2s.

JANUARY 12.—**Huddersfield.**—HOUSE.—For various works required in the erection of a house at Dingley-road. Mr. J. H. Hall & Son, architects and surveyors, 19, Exchange Buildings, Market-street, Huddersfield.

JANUARY 12.—**Leominster.**—HOUSES.—For construction of 28 houses on the Caswell Fields site, for the C.B. Mr. W. T. Sale, Town Clerk, Town Hall.

JANUARY 12.—**Nuneaton.**—HOUSES.—For construction of a storm water pumping station at St. Mary's-road Pumping Station, for the C.B. Mr. R. C. Moon, Borough Engineer and Surveyor, Municipal Offices. Deposit £2 2s.

JANUARY 12.—**Plymouth.**—HOUSES.—For erection of 800 houses at North Prospect, for the C.B. Mr. J. Wibberley, Borough Engineer and Surveyor, Municipal Offices.

JANUARY 12.—**Port Talbot.**—PAVILION.—For carrying out a pavilion, for the C.B. Mr. M. Thomas, Town Clerk.

JANUARY 12.—**Sheffield.**—ALTERATIONS.—For erection of hutments and alterations at Greystones and Mandcliffe-road Council Schools, for the E.C. Mr. F. E. P. Edwards, F.R.I.B.A., City Architect, Town Hall. Deposit £2.

JANUARY 12.—**Sheffield.**—EXTENSIONS.—For erection of new buildings at the Firth Park secondary school for boys, Barnsley-road, for the T.C. Mr. F. E. P. Edwards, F.R.I.B.A., City Architect, Town Hall. Deposit £2.

JANUARY 12.—**Tynemouth.**—HOUSES.—For erection of 21 blocks of maisonnettes on the Balkwell estate, Chirton, North Shields, for the C.B. Mr. Stanley Wilson, Town Clerk, Town Clerk's Office, 15, Northumberland-square, North Shields. Deposit £1 1s.

✱JANUARY 12.—**West Bromwich.**—ALTERATIONS AND REPAIRS.—Carrying out of alterations and repairs at the Guardians' Institution, Hallam-street, West Bromwich, for the Guardians of the West Bromwich Union. Mr. A. H. Ward, Clerk, 22, Lombard-street, West Bromwich. Deposit £3 3s.

JANUARY 13.—**Barking Town.**—HOUSES.—For erection of about 50 houses on the Eastbury estate, Ripple-road, and five houses in Abbey-road, Barking, for the U.D.C. Mr. H. Hargreaves, Clerk, Public Offices, Barking. Deposit £5.

JANUARY 13.—**Croydon.**—BUILDINGS.—Erection and completion of Welfare and School Clinics and Sick Nursery Buildings upon a site situate in Lodge-road, Croydon, for the County Borough of Croydon. Borough Engineer, Town Hall, Croydon. Deposit £3 3s.

JANUARY 13.—**Croydon.**—UNDERGROUND CONVENIENCE.—Construction of an underground convenience for women at Parchmore-road, Thornton Heath, for the County Borough Council of Croydon. Borough Engineer, Town Hall, Croydon. Deposit £1 1s.

JANUARY 13.—**Glasgow.**—SANATORIUM.—For erection of Mearnskirk Sanatorium, Mearns, Renfrewshire, including plaster work, glazier work, tile work, and terrazzo work, for the T.C. Mr. J. Lindsay, Town Clerk, City Chambers. Deposit £5 5s. each.

JANUARY 13.—**Liverpool.**—PAINTING.—For proposed external painting to west block and nurses' home, and internal painting to certain dayrooms at the Kirkdale Homes, and proposed internal painting to certain cottages and main hall and staircase, administration block, at the Cottage Home, Olive Mount, for the West Derby B.G. Mr. G. W. Coster, Clerk to the Guardians, Union Offices, Brougham-terrace.

JANUARY 13.—**Norwich.**—HOUSES.—Erection of 300 houses on the Earlham estate, Norwich, for the City Corporation, to be erected for the Corporation of Norwich. The work is divided into four sections. Mr. Arnold H. Miller, Town Clerk, Guildhall, Norwich.

JANUARY 13.—**Sandown.**—BUILDING.—For erection of steel framed buildings in the Council's Highway Depot, for the U.D.C. Mr. R. Jones, Clerk of the Council, Town Hall, Sandown, Isle of Wight.

JANUARY 13.—**Treorchy.**—SKITTLE ALLEY.—For erection of a skittle-alley, for the Pare and Dare Unionist Club, Cwmpare. Secretary of the Club.

JANUARY 14.—**Goole.**—HOUSES.—For erection of 16 "A" Type houses, and 20 "B" Type houses on the Pasture-road site, for the U.D.C. Mr. J. W. Pullon, Clerk to the Council, Council Offices. Deposit £2 2s.

✱JANUARY 14.—**Hove.**—WALL.—For constructing a retaining wall at the Council's depot in Sackville-road, for the C.B. Mr. W. Jermyn Harrison, Town Clerk, Town Hall.

JANUARY 14.—**London.**—BUILDING.—For lavatory building at the Institution, Plumstead High-street, for the Woolwich B.G. Mr. A. Holder, Clerk to the Guardians, 99, Rectory-place.

JANUARY 14.—**Stafford.**—OPERATING THEATRE.—Tenders for new operating theatre and consequent small alterations at the existing Infirmary, for the Board of Management of the Staffordshire General Infirmary, Stafford. Secretary at the Infirmary. Deposit £2.

JANUARY 15.—**Darlington.**—ELEMENTARY SCHOOL.—Erection of an elementary school on a site adjoining Bates-avenue and Stooperdale-avenue, Cockerton, Darlington, for the Darlington Corporation. Mr. H. G. Steavenson, Town Clerk, Houndgate, Darlington. Deposit £2 2s.

JANUARY 15.—**Langley.**—POLICE STATION.—For erection of a police station and six residences at Langley, near Oldbury, for the Worcestershire C.C. Mr. A. Vernon Rowe, County Architect, 38, Foregate-street, Worcester.

JANUARY 15.—**Linthwaite.**—BUNGALOW.—For bricklayers', roof tilers', plumbers' and plasterers' work required to be done in the erection and completion of a bungalow in Newsome-road South. Mr. E. Bower, architect and surveyor, Jovil, Linthwaite.

JANUARY 15.—**Ripon.**—OFFICES.—For erection of offices on the premises of T. & R. Williamson, Ltd., Varnish Works. Mr. H. E. Illingworth, architect, 8, East-parade, Leeds.

JANUARY 16.—**Birkenhead.**—HOUSES.—Erection of 200 subsidy houses in concrete, brickwork, or concrete and brickwork, on the Tranmere Hall Estate, Birkenhead, for the Corporation of Birkenhead. Mr. Chas. Brownridge, Borough Engineer and Surveyor, Town Hall, Birkenhead. Deposit £2 2s.

JANUARY 16.—**Blackpool.**—CLINIC.—For erection of a new medical clinic, with concrete walling, in Bennett-avenue, off Palatine-road, for the C.B. Mr. Francis Wood, Borough Engineer and Surveyor, Municipal Buildings, Town Hall-street.

JANUARY 16.—**Bristol.**—SUB-STATIONS.—For construction of 12 underground and six above-ground substations, for the T.C. Mr. H. Faraday Proctor, Chief Engineer and General Manager, Electricity Department, Colston-avenue. Deposit £2 2s.

JANUARY 16.—**Caerau.**—HALL.—For erection and completion of a billiard hall and assembly hall adjoining the Caerau Library, for Messrs. North's Workmen's Libraries. Mr. Oswald D. Davies, architect and surveyor, 18, King's-terrace, Nantyffyllon. Deposit £2 2s.

JANUARY 16.—**London, N.W.**—RESEARCH STATION.—Erection of new chemical laboratory at Dollis Hill P.O. Research Station, for the Commissioners of H.M. Office of Works. Contracts Branch, H.M. Office of Works, King Charles-street, London, S.W.1. Deposit £1 1s. (cheques payable to the Commissioners of H.M. Works, &c.)

JANUARY 16.—**Okehampton.**—HOUSES.—For erection of four working-class dwellings at Northawton, for the R.D.C. Mr. S. Hawken, Clerk of the Council.

✱JANUARY 17.—**Rotherham.**—HOUSES.—Erection of a further 500 houses on Section "F" of the Eastdene estate, for the County Borough of Rotherham. Mr. Chas. A. Broadhead, architect, "Devonshire House," Moorgate, Rotherham. Deposit £2 2s.

✱JANUARY 19.—**Billericay, Essex.**—NEW INFIRMARY, &C.—Erection of a new infirmary (70 beds), administration block, and operating theatre, on a site adjoining the Workhouse at Billericay, Essex, for the Guardians of the Billericay Union. Mr. Walter Lawrance, F.S.I., 13, Hart-street, Bloomsbury-square, W.C.1. Deposit £3 3s., with the Clerk to the Guardians.

JANUARY 19.—**Birmingham.**—ALTERATIONS.—For alterations and additions at the Selly Oak Hospital, to provide new nurses' dining room, new kitchen, staff dining rooms, &c., for the B.G. Mr. J. Curtis, Clerk to the Guardians, Union Offices, Edmund-street. Deposit £10 10s.

JANUARY 19.—**Carlton.**—CONVENIENCE.—For erection of a public urinal, Main-street, for the U.D.C. Mr. E. W. Turpin, Clerk. Deposit £1 1s.

✱JANUARY 19.—**Carnarvon.**—HOUSES.—Erection of 22 houses, for the Carnarvon Corporation. Mr. Rowland Lloyd Jones, architect, 14, Market-street, Carnarvon.

JANUARY 19.—**Dublin.**—SWITCH-ROOM.—For erection of an electric switch-room at Amiens-street Station, for the Directors. Mr. J. B. Stephens, Secretary, Amiens-street Station. Deposit £2 2s.

JANUARY 19.—**Felixstowe.**—HOUSES.—Erection of 38 houses in St. Andrew's-road, within the Felixstowe U.D.C. Mr. Harry Clegg, Engineer and Surveyor to the Council, Town Hall, Felixstowe.

JANUARY 19.—**Hitchin.**—ALTERATIONS AND ADDITIONS.—Alterations and additions to Hitchin Union Infirmary, for the Guardians of the Hitchin Union. Mr. A. E. Passingham, Clerk, 5, Bancroft, Hitchin. Deposit £2 2s.

JANUARY 19.—**London, W.4.**—SUPPLY OF STORES AND WORK.—To contractors, merchants, and others. Execution of work and supply of stores (separately), for the Chiswick U.D.C. Mr. Edward Willis, Engineer and Surveyor, Town Hall, Chiswick, W.4, by sending stamped addressed envelope.

JANUARY 19.—**Pontllanfraith.**—ALTERATIONS.—For alterations to existing buildings for conversion into a mining centre, for the Monmouthshire E.C. Mr. J. Bain, F.R.I.B.A., County Hall, Newport. Deposit £1 1s.

✱JANUARY 19.—**St. Albans.**—COTTAGES.—Erection of first 50 cottages at the Camp housing site. The 50 cottages will be divided into four contracts—three of 12 cottages, and one of 14 cottages. Contractors may tender for one or more sections, but separate tenders must be sent in for each, for the Corporation of the City of St. Albans. Mr. F. T. Negus, City Engineer and Surveyor, 96, Victoria-street, St. Albans. Deposit £1 1s.

JANUARY 19.—**Staveley.**—SCHOOL.—For erection of a new Council school for about 680 children, for the Derbyshire E.C. Mr. G. H. Widdows, F.R.I.B.A., Architect to the Committee, County Offices, St. Mary's Gate, Derby. Deposit £1 1s.

JANUARY 19.—**Wombwell.**—HOUSES.—Erection of sixty type "A" houses, on a site situate in King's-road, Wombwell, for the Wombwell U.D.C. Mr. D. H. Roberts, Park-street, Wombwell. Deposit £2.

JANUARY 20.—**Ilkley.**—FENCING.—For the erection of boundary wall and fencing to playing field at Ilkley, Ben Rhydding Council school, for the West Riding E.C. Education Department, County Hall, Wakefield.

✱JANUARY 20.—**Manchester.**—HOUSES.—Erection of from 4 to 200 houses on the Blackley estate (south-west of Plant Hill-road, and near Symonds-road), such number to be clearly set out on tender submitted, for the Housing Committee of the City of Manchester. The Housing Director, Town Hall. Deposit £2 2s.

JANUARY 21.—**Sussex.**—POST OFFICE.—Erection of a Post Office, &c., at Crowborough, Sussex, for the Commissioners of H.M. Office of Works. Contracts Branch, H.M.O.W., King Charles-street, London, S.W.1. Deposit £1 1s. (Cheques payable to the Commissioners of H.M. Works, &c.).

JANUARY 22.—**Bristol.**—ALTERATIONS.—For work required in extending and altering offices at Queen-square, for the Port of Bristol. Messrs. W. S. Skinner & Sons, Architects, 27, Orchard-street. Deposit £3 3s.

JANUARY 22.—**Guildford.**—HOUSES.—For four blocks of flats and a pair of houses to be built at Grange-road, for the C.B. Mr. W. G. Cross, Borough Engineer and Surveyor, Municipal Offices, Tuns Gate.

JANUARY 22.—**London.**—ROOFING WORK.—Renewal of roofing, skylights and gutters, and repainting, &c., at the locomotive and carriage works, Oswestry, for the Great Western Railway. Mr. A. E. Bolter, Secretary, Paddington Station, London, endorsed "Tender for Roofing, &c.," Oswestry.

JANUARY 22.—**London, W.**—TELEPHONE EXCHANGE.—Erection of telephone exchange at Maida Vale, for the Commissioners of H.M. Office of Works. Contracts Branch, H.M. Office of Works, King Charles-street, London, S.W.1. Deposit £1 1s. (cheques payable to the Commissioners of H.M. Works, &c.).

JANUARY 23.—**Chelmsford.**—HOUSES.—For erection and completion of 100 houses on the Boarded Barns estate, for the C.B. Mr. G. E. Barford, Town Clerk, Municipal Offices. Deposit £2 2s.

JANUARY 23.—**West Bromwich.**—ALTERATIONS.—For alterations and repairs at the Institution, Hallam-street, for the B.G. Mr. A. H. Ward, Clerk, 22, Lombard-street. Deposit £3 3s.

✱JANUARY 23.—**West Bromwich.**—TRADES.—For builders' work at the Institution, Hallam-street, for the B.G. Mr. A. H. Ward, clerk, 22, Lombard-street. Deposit £3 3s.

JANUARY 23.—**Yorks.**—POST OFFICE.—Erection of a Post Office at Hebden Bridge, Yorks, for the Commissioners of H.M. Office of Works. Contracts Branch, H.M.O.W., King Charles-street, London, S.W.1. Deposit £1 1s. (Cheques payable to the Commissioners of H.M. Works, &c.).

JANUARY 24.—**Westhampnett.**—HOUSES.—For the erection of 42 houses proposed to be built by the R.D.C. Mr. W. D. Rasell, Clerk to the Council, Council Offices, Pallant House, Chichester.

JANUARY 24.—**West Hartlepool.**—TELEPHONE EXCHANGE.—Erection of a telephone exchange at Baltic Chambers, West Hartlepool, for the Commissioners of H.M. Office of Works. Contracts Branch, H.M.O.W., King Charles-street, London, S.W.1. Deposit £1 1s. (Cheques payable to the Commissioners of H.M. Works, &c.).

✱JANUARY 27.—**Pwllheli.**—HOUSES.—Erection and completion of 12 houses (subsidy parlour type) on the Abererch-road site, for the Borough Council of Pwllheli. The Borough Surveyor, Town Hall, Pwllheli.

✱NO DATE.—**Betchworth, Surrey.**—HOUSES.—Erection and completion of 20 houses in Buckland parish, in blocks of two, four or six (more than 20 houses will ultimately be required), for the Buckland and Betchworth Housing Society, Ltd., Reigate Rural District. No tender will be entertained of over £400 per house complete, and including foundations and drainage. Apply to the Secretary, Buckland and Betchworth Housing Society, Ltd., Betchworth, Surrey.

NO DATE.—**Dublin.**—ADDITIONS.—For building a new wing to the Dominican Convent, Muckross Park, Mariborough-road. Mr. R. M. Butler, F.R.I.B.A., Architect, 23, Kildare-street.

FURNITURE, MATERIALS, etc.

JANUARY 12.—**Bathgate.**—BRICKS.—For supply of about 3,000 fireclay pipes from 6 to 24 in. diameter, and 40,000 of pressed composition bricks, for the D.C. Mr. J. G. B. Henderson, Clerk to Bathgate District Committee, Linlithgow.

JANUARY 13.—**Liverpool.**—FITTINGS.—For supply of fittings and furniture required at the Central Technical School extension, for the Corporation. Mr. W. Moon, Town Clerk, Municipal Buildings.

✱JANUARY 13.—**Southall-Norwood.**—MATERIALS.—For supply of granite, lime, cement, sand and gravel, for the U.D.C. Mr. J. B. Thomson, Engineer and Surveyor, Town Hall.

JANUARY 14.—**Horsham.**—MATERIALS.—For supply of first quality slag chippings and pea gravel and shingle, and sharp sand, for the U.D.C. Mr. A. Slyfield, Clerk to the Council, 3, Market-square.

JANUARY 15.—**Manchester.**—PIPES.—For supply of earthenware or stoneware drain pipes, for the T.C. Mr. F. M. Heath, Town Clerk, Town Hall.

JANUARY 20.—**Baildon.**—WATER MAINS.—For supply of 150 tons of 8 in., 7 in., 6 in., 5 in., and 4 in. spigot and socket cast-iron water main, for the U.D.C. Mr. R. Howard Moore, Clerk. Deposit £2 2s.

JANUARY 20.—**Oxford.**—KERB.—For supply and delivery of approximately 45,000 yds. of 9 in. by 6 in. concrete kerb, for the C.C. Mr. A. E. Cockerton. County Surveyor.

✱JANUARY 21.—**Chelsea, S.W.3.**—SUPPLY OF VARIOUS ARTICLES AND WORKS.—The supply and execution of various articles and works, the contract period being from April 1 next to March 31, 1926, unless otherwise stated, for the Metropolitan Borough of Chelsea. Town Hall, King's-road, Chelsea, S.W.3.

JANUARY 21.—**Winchester.**—CEMENT.—For supply and delivery of British made cement, for the Hampshire C.C. Mr. W. J. Taylor, County Surveyor, The Castle.

JANUARY 24.— **Chelmsford.** — MATERIALS. — For supply of stoneware pipes, broken granite, &c., for the Essex C.C. Mr. Wm. H. Morgan, Chartered Civil Engineer, County Surveyor, Old Court.

JANUARY 26.—**Wakefield.**—MATERIALS.—For supply of granite and whinstone, sand and gravel, stoneware pipes, cast-iron gulley grates and frames, for the West Riding C.C. Clerk of the County Council, County Hall.

ENGINEERING, IRON AND STEEL.

JANUARY 12.—**Boston.**—BRIDGE.—For erection of a ferro-concrete bridge, at Chapel-hill, near Boston, for the R.D.C. Mr. A. Barton, Engineer and Surveyor, 8, Market-place.

JANUARY 19.—**London.**—STEELWORK.—For supply of steelwork for the renewal of Bassington-road and Holderness Drain Bridges, for the L.N.E.Rly. Messrs. James McLaren, G. F. Thurston, Joint Secretaries, Secretary's Office, Marylebone Station, N.W.1.

JANUARY 23.—**Gravesend.**—STEEL.—For supplying the necessary steel and iron work for a steel-frame building, for the C.B. Mr. H. H. Brown, Town Clerk.

JANUARY 24.—**Blackpool.**—BRIDGES.—For three steel trough bridges to carry water pipes, for the Fylde Water Board. Mr. Geo. F. Atkinson, Engineer, Head Office, Sefton-street.

FEBRUARY 25.—**Madras.**—SLUICES.—For supply and delivery of 24 in. and 27 in. diameter cast-iron wall sluices, with pillars and headstocks, fitted with gun-metal faces, adjustable wedge blocks and bolts, &c., for each wall sluice complete, for the Corporation. Messrs. J. Mansergh & Sons, Agents to the Corporation of Madras, India, 5, Victoria-street, S.W.1.

ROAD, SANITARY, AND WATER WORKS.

JANUARY 10.—**Tynemouth.** STREETS.—For execution of certain street works upon the Balkwell estate, for the Corporation. Mr. F. Smillie, Borough Surveyor.

JANUARY 12.—**Bathgate.**—SEWERS.—For laying and jointing of about 1¼ miles of fireclay sewers from 6 to 15 in. diameter, and the building of sedimentation tanks and relative works, for the D.C. Mr. J. G. B. Henderson, Clerk to Bathgate District Committee, Linlithgow. Deposit £1.

JANUARY 12.—**Caerphilly (near).**—SEWER CONNECTION.—Constructing a sewer connection at Gwaunabara, near Caerphilly, of approximately 280 lin. yds. of 18 in. and 24 in. stoneware and cast-iron sewer, with manholes, for the Caerphilly U.D.C. Mr. T. H. Richards, Surveyor, Council Offices, Caerphilly. Deposit £2 2s.

JANUARY 12.—**Hambledon.**—MAIN.—For carrying out an extension of the water main in White-lane, St. Martha, near Chilworth, for the R.D.C. Mr. Hugh A. Merriman, Clerk, 138, High-street.

JANUARY 12.—**Manchester.**—WIDENING.—For widening, paving and competing of Crescent-road, &c., Crumpsall and Cheetham, for the T.C. Mr. P. M. Heath, Town Clerk, Town Hall, Manchester. Deposit £2 2s.

JANUARY 12. **Sittingbourne.**—RECONSTRUCTION.—For reconstruction of a section of the footway in the High-street, for the U.D.C. Mr. G. H. Potter, Clerk to the Council, 76, High-street.

JANUARY 13.—**Anglesey.**—SEWERAGE.—For construction of cast-iron sea outfall, concrete tank sewer, pipe sewers, manholes, &c., for the Valley R.D.C. Mr. Owen J. Hughes, Clerk to the Council, Valley, Anglesey. Deposit £5.

JANUARY 13.—**Birmingham.**—REPAIRS.—For repairs to roads at the Erdington House Institution, for the B.G. Mr. J. Curtis, Clerk to the Guardians, Union Offices, Edmund-street. Deposit £2 2s.

JANUARY 13.—**Mitcham.**—ROAD.—For making-up Swains-road, for the U.D.C. Mr. S. Chart, Clerk, Vestry Hall.

JANUARY 13.—**Mynyddislwyn.**—SEWERS.—For construction of sewers, &c., for the U.D.C. Mr. Trevor C. Griffiths, Clerk to the Council, Council Offices, Pontllanfraith, Mon. Deposit £2 2s.

JANUARY 14.—**Glamorgan.**—ROADS.—For widening between Dynevor railway bridge and Lonias of the Neath and Swansea main road, and widening at Skewen, for the C.C. Mr. T. Mansel Franklen, Clerk of the C.C., Glamorgan County Hall, Cardiff.

JANUARY 14.—**Harwich.**—PAVING.—For making-up, kerbing, paving, channelling, &c., at Orwell-road, St. Michael's-road, part of Empire-road, for the C.B. Mr. F. H. French, Borough Engineer and Surveyor, £1 1s.

JANUARY 14.—**Whitley and Monkseaton.**—SEWERS.—For extensions of pipe sewers on the West Monkseaton Estate, Marden Estate, Grange Park Estate, for the U.D.C. Mr. A. Barker, Clerk to the Council, Council Offices, Whitley Bay.

JANUARY 15.—**Bedwellty.**—ROADS.—For the following works at Aberbargoed:—(1) Access road (approximately 20 yards in length) from Commercial-street to Pant-street; (2) making up Heol-y-felin under the Private Street Works Act, 1892, for the U.D.C. Mr. W. D. R. Lewis, Clerk to the Council, Council Offices, Aberbargoed, Mon.

JANUARY 15.—**Bucks.**—ROAD.—For reconstruction work of the High Wycombe-Stokenchurch road, for the C.C. Mr. E. Winfield, County Surveyor, Lloyds Bank Chambers, Aylesbury. Deposit £10.

JANUARY 15.—**Chelmsford.**—PAVING.—For carrying out wood block paving on reinforced concrete foundation and other work, in Baddow-road, from Moulsham-street to Goldlay-road, for the C.B. Mr. G. E. Barford, Town Clerk, Municipal Offices. Deposit £1 1s.

JANUARY 15.—**Chester.**—ROAD.—For construction of a new road, for the T.C. Mr. J. H. Dickson, Town Clerk, Town Hall, Chester. Deposit £2 2s.

JANUARY 15.—**Newton Abbot.**—WIDENING.—For road widening at the junction of Bovey-road and Exeter-road, for the U.D.C. Mr. E. A. Wyatt, Clerk to the Council, Town Hall.

JANUARY 15.—**Yeardsley-cum-Whaley.**—SEWERS.—For construction of about 730 lineal yards of 9 in., 6 in. and 4 in. stoneware pipe sewers, with the necessary manholes, house connections, &c., in connection therewith, at Stone Heads, Whaley Bridge, for the U.D.C. Mr. J. Ernest Griffiths, Clerk to the Council, Council Offices, Whaley Bridge. Deposit £2 2s.

JANUARY 16.—**Calder.**—PIPES.—For laying and jointing of about seven miles of cast-iron pipes from 7 in. to 3 in. diameter, and constructing a concrete tank, with relative works, for the D.C. Mr. A. G. G. Asher, County Clerk, County Buildings, Edinburgh. Deposit £1.

JANUARY 16.—**London Colney.**—DRAINAGE.—For main drainage of London Colney, consisting of sewers, manholes, outfall works, ejector chambers, engine house, &c., for the St. Albans R.D.C. Mr. E. F. W. Hieatt, Clerk to the R.D.C., Union Offices. Deposit £3 3s.

JANUARY 16.—**Paignton.**—MAIN.—For laying a 6 in. cast-iron water main, with connections, from Colley-end to Sands-road, for the U.D.C. Mr. J. Hartley, Clerk to the Council, Town Hall. Deposit £1 1s.

JANUARY 17.—**Bootle.**—STREET WORK.—For private street works at the back street between Hemans-street and Shakespeare-street; back passage at rear of Nos. 109 to 115, Knowsley-road, for the C.B. Mr. J. Spencer Tumilty, Town Clerk, Town Hall.

JANUARY 17.—**Chesterfield.**—MAINS.—For laying and jointing of 810 yds. of 6 in. main, in the parishes of Staveley and Sutton cum Duckmanton, 937 yds. of 5 in. main, in the parish of Sutton cum Duckmanton, 2,368 yds. of 4 in. main in the parish of Sutton cum Duckmanton, for the R.D.C. Mr. R. F. Hartwright, Clerk to the Council, Union Offices. Deposit £1 1s.

JANUARY 17.—**Inverness.**—ROAD.—For construction of a section of the Inverness-Perth road, for the C.C. Mr. J. W. McKillop, County Clerk, The Castle, Inverness. Deposit £3 3s.

JANUARY 17.—**Sedgley.**—SEWERS.—For laying and jointing of about three miles of 12 in., 9 in., and 6 in. glazed stoneware and cast-iron pipe sewers, together with manholes, storm overflow, and other incidental works, for the U.D.C. Mr. T. R. Knight, Clerk of the Council, Council House. Deposit £5 5s.

JANUARY 17.—**Wortley.**—ROAD IMPROVEMENT.—For improvement of the Wakefield and Sheffield main road at Chapeltown, for the West Riding C.C. Clerk of the County Council, County Hall, Wakefield. Deposit £1.

JANUARY 19. — **Kingston-upon-Thames.** — ROADS AND SEWERS.—Construction on the housing site of roads and sewers, for the Corporation of Kingston-upon-Thames. Borough Surveyor, Municipal Offices Kingston-upon-Thames. Deposit £1 1s.

JANUARY 19.—**Salford.**—VARIOUS.—For reinforced concrete work, asphalting, &c., at the Old People's Home, Stott-lane, Pendleton. Mr. E. M. Inchley, Clerk to the Guardians, Poor Law Offices, Eccles New-road.

JANUARY 20.—**Dunfermline.**—SEWER.—For construction of nearly two miles of the main outfall sewer, for the T.C. Mr. Andrew Shearer, Town Clerk, City Chambers. Deposit £3 3s.

JANUARY 20.—**Fareham.**—SEWERS.—For construction and maintenance of about 2,900 yards lineal of stoneware pipe sewers from 6 in. to 12 in. diameter, with manholes and ventilators; the construction of concrete storage and sedimentation tanks, with percolating filters, humus pits, engine house, and other works incidental thereto, at Titchfield, for the R.D.C. Mr. H. A. Watts, Clerk to the Council, 97, West-street.

JANUARY 20.—**Rowley Regis.**—PAVING.—For paving footpaths, laying limestone crossings, new kerbing and channelling, and for relaying kerbing and channelling in certain streets and roads, for the U.D.C. Mr. D. Wright, Clerk to the Council.

JANUARY 21.—**Fleet.**—PIPES.—For construction of several miles of cast-iron and stoneware sewers, brick, concrete and cast-iron manholes, flushing tanks, ventilating shafts and columns, cast-iron rising main, air mains and additions to the sewage disposal works, and other incidental work, for the U.D.C. Mr. E. Nash, Solicitor and Clerk to the Council, Council Offices, Fleet (Hants.). Deposit, £10.

JANUARY 22.—**Camborne.**—SEWERS.—For providing and laying about nine miles of stoneware sewers and the construction of manholes and other work in connection therewith, and driving of a tunnel, about 1,000 yards in length, and providing and laying a 24 in. by 16 in. egg-shaped sewer; and providing and laying about 175 yards of 18 in. cast-iron outfall sewer, for the U.D.C. Mr. D. W. Thomas, Clerk to the Council. Deposit £3 3s.

✱JANUARY 22.—**London, S.W.2.**—WORKS AND MATERIALS.—Works required to be done and materials supplied and used in the formation and laying-out of sewers and builder's roads on the remainder of the Bloomfield Housing Estate, Central Hill, Upper Norwood, for the Lambeth Borough Council. Mr. Osmond Cattlin, A.M.Inst.C.E. (Chartered Civil Engineer), Borough Engineer, Town Hall, Brixton-hill, S.W.2. Deposit £2 2s.

JANUARY 26.—**Axminster.**—IMPROVEMENT.—For improvement of the existing road between Tanyard Cross and Axmouth Bridge, for the R.D.C. Mr. Cecil Forward, Clerk. Deposit £3 3s.

JANUARY 27.—**Southall-Norwood.**—ROAD.—For construction of a new road between King-street and Western-road, for the U.D.C. Mr. J. B. Thomson, Engineer and Surveyor, Town Hall.

JANUARY 31.—**Clayton-le-Moors.**—SEWER.—For laying of 870 lineal yards of 12 to 15 in. earthenware pipe sewer, between Hyndburn Bridge and Sparth-road, in Whalley-road, for the U.D.C. Mr. A. Dodgeon, Surveyor to the Council, Council Offices.

JANUARY 31.—**Mull.**—ROAD.—For construction of 1,400 yds. of roadway in the Island of Tiree, for the D.C. Mr. D. M. Mackinnon, Mull District Clerk, County Buildings, Oban.

NO DATE.—**Market Harborough.**—POSTS.—For provision and erection of approximately 1,370 yds. of reinforced concrete posts and steel wire fencing, with gates, &c., for the R.D.C. Mr. F. C. Salmon, Surveyor to the Council, Kibworth Harcourt, Leicester.

Competitions.

(*See Competition News, page* 40.)

Auction Sales, Tenders, etc.

JANUARY 12.—**Wimbledon Common.**—Messrs. Veryard & Yates, F.A.I., will sell, without reserve, to clear site, Wressil Lodge, Park Side, timber and building materials, at 1 o'clock. Auctioneers, 365, Norwood-road, S.E.27.

JANUARY 14.—**London, E.**—Messrs. J. T. Skelding & Co., without reserve, owing to expiration of lease, at the Building Material Depot, Tredegar-square, Mile End-road, E., timber and building materials, including 200 tons of old oak beams and scantlings, R.S. joists, steam pipe and fittings, slates, scaffolding, trailer, vans, timber and corrugated iron sheets, &c. Auctioneers, 48, Gresham-street, Guildhall, E.C.2.

JANUARY 14.—**Merton.**—Messrs. Veryard & Yates, F.A.I., will sell, without reserve, building material, &c., adjoining Wandle Bridge, opposite "Six Bells," at 1 o'clock. Auctioneers, 365, Norwood-road, S.E.27.

JANUARY 14 AND 15.—**Bedfordshire.**—Messrs. Perry & Phillips will sell (unless previously sold by private treaty), at "Cranfield Court," Bedfordshire, the whole of the interior and exterior fixtures and fittings previous to demolition. Auctioneers, High-street, Bridgnorth.

JANUARY 15.—**London, E.C.**—Messrs. Ernest Owers, Ltd., will sell (unless previously sold privately), at the Mart, 155, Queen Victoria-street, E.C., by order of executors of late G. Warman, Theydon Bois, Essex, about 8 acres of valuable freehold land. Auctioneers, 155, Queen Victoria-street, E.C.

✱JANUARY 20.—**Middlesex.**—Mr. F. H. Clark will sell, at the National Filling Factory, Hayes, Middlesex, a freehold factory, with immediate possession, situated in the rapidly developing district of Hayes; also hutting, timber and building materials (new and second-hand), 10 tons of galvanised corrugated iron sheets. Auctioneers, Railway Wharf, York-road, Wandsworth, S.W.18.

JANUARY 21.—**London, E.C.3.**—Messrs. Fuller, Horsey, Sons, & Cassell will sell, *re* Canal Transport, Ltd., Iver, Bucks, by order of George Lord, Esq., F.C.A., Receiver for the Debenture holders, at the Merchants' Hall, Baltic Exchange, St. Mary Axe, E.C.3, precisely as a first lot, the leasehold sand and gravel pits at Iver; also sale in lots in detail of the plant and machinery, including 24 canal barges. Auctioneers, 11, Billiter-square, E.C.3.

JANUARY 27 AND FOUR FOLLOWING DAYS.—**Blackmore Park.**—Messrs. Ingram & Mills will sell the mansion at Blackmore Park for demolition purposes (unless previously disposed of privately). Auctioneers, 47, Foregate-street, Worcester.

DATE ANNOUNCED LATER.—**Middlesex.**—Messrs. Farebrother will sell, early in the ensuing year (unless previously disposed of privately), freehold property at Twickenham, Middlesex, comprising an extensive range of modern workshops, manager's residence, &c. Auctioneers, 29, Fleet-street, London, E.C.4.

Public Appointments.

JANUARY 12.—**York.**—Clerk of Works required by the City of York. Mr. F. W. Spurr, City Engineer, Guildhall, York.

JANUARY 14.—**London, W.C.2.**—Temporary Architectural Assistant required by the Westminster City Council at a salary of 10 guineas per week, for a period of about three months. Mr. John Hunt, Town Clerk, Westminster City Hall, Charing Cross-road, W.C.2.

JANUARY 14.—**Portsmouth.**—Architects with experience in designing and supervising the erection of abattoirs required by the Portsmouth Corporation. Mr. F. J. Sparks, Town Clerk, Town Hall, Portsmouth.

✱JANUARY 24.—**London, S.W.7.**—Foreman of Works required by the Board of Education in the Science Museum. The Director, Science Museum, South Kensington, London, S.W.7.

✱NO DATE.—**Hong Kong.**—Three Architectural Assistants required by the Government of Hong Kong for service in the Architectural Office of the Public Works Department, for a period of three years, with possible permanency. Apply at once to the Crown Agents for the Colonies, 4, Millbank, Westminster, S.W.1, quoting M/.2919.

✱NO DATE.—**Sudan.**—Foreman of Works required in the Public Works Department by the Sudan Government. Progressive post if permanently retained. Free second-class passage out and home. Inspecting Engineer, Sudan Government, Wellington House, Buckingham Gate, S.W.1, and mark the envelope "Foreman of Works."

PROPOSED NEW BUILDINGS & OTHER WORKS*

In these lists care is taken to ensure the accuracy of the information given, but it may occasionally happen that, owing to building owners taking the responsibility of commencing work before plans are finally approved by the local authorities, "proposed" works at the time of publication have been actually commenced. Abbreviations: T.C. for Town Council; U.D.C. for Urban District Council; R.D.C. for Rural District Council; E.C. for Education Committee; B.G. for Board of Guardians; B.C. for Borough Council; P.C. for Parish Council; M.H. for Ministry of Health; M.T. for Ministry of Transport; C.B. for County Borough; and B.E. for Board of Education

ABERDEEN.—The T.C. approved of a draft Provisional Order authorising the Corporation "to use part of the Links for entertainment buildings; to make further provision with respect to the Esplanade; and to borrow moneys for construction of entertainment buildings, £50,000; transfer and improvement of Sea Beach bathing station, £20,000; and provision of public baths and wash-houses, £100,000."

ABERYSTWYTH.—The R.D.C. has decided, subject to M.H. approval, to proceed with the erection of 12 houses at Llanbardaufawr, four at Llanilar, four at Llanfihangel-y-Creuddyn, four at Goginau, four at Penllwyn, four at Penrhyncoch, four at Goss, four at New Goss, four at Bow-street, four at Llandre, and four at Tre'rddol. In addition the Council is to erect four houses near Trawscoed Station.

ABKSEY.—Plans for the extensions to Endowed School have now been prepared by the County Architect. Plans have been approved. The cost will be about £3,000.

AYR.—The Dean of Guild Court passed plans: Two villas, St. Leonard s-road, Mr. Wm. Drinnan, George-street; eight cottages, Quail-road, Mr. R. Hutchison; cottage, Hawkhill-avenue, Mr. T. M'Caig; house and shop, 63, Peebles-street, Mr. Jas. Gallacher; villa, corner of Monument-road and Bellevue-avenue, J. & D. Meikle; three double cottages, Chalmers-road East, W. Paton & Sons.

BAKEWELL.—The R.D.C. has received an offer from a private person to pay half the cost of a bridge made of oak and concrete at the stepping-stones at Offerton, near Hathersage.

BARKING.—The E.C. is to build a new central school to accommodate 640 pupils at Wilmington-gardens.

BARKING TOWN.—The U.D.C. has received sanction from the M.H. to erect five houses on land in Abbey-road, and 20 houses on land in Bamber-road. Tenders are to be invited for the erection of the five houses.

BATH.—The City Engineer of the T.C. was instructed to report as to whether a site could be found for a convenience near the top of Brougham Hayes.—The M.H. approved the granting of financial assistance in respect of an additional 20 houses.—The M.H. has consented and the architect has been instructed to invite tenders for the erection of houses to complete the scheme at Englishcombe Park. The architect is to report upon the question of the provision of shops with housing accommodation, on the plots adjoining Chestnut-grove.—The Cotford sub-committee report that they propose to erect three more pair of cottages, at an estimated cost of £2,300.—The Surveyor of Corporate Property was instructed to prepare plans for adaptation of the covered playground of the boys' school for provision of a room for practical science and a room for mathematical and technical drawing with all necessary equipment, and for the erection of a shed at the west end of the playground at Oldfield Council school.—The Wells sub-committee report that they are desirous of converting the Knap Hill house into a residence for the Farm Bailiff, in accordance with a plan prepared by the Clerk of Works, at an estimated cost of £909, subject to the approval of the Local Authorities and the M.H.—The T.C. are to carry out various alterations, which are to cost £20,000. The Town Clerk is to apply to the M.H. for the money.—Plans approved: Lecture and drill hall, Pulteney-mews; house, Charlcombe-lane; house, Wellsway; houses, Warminster-road.

BEXHILL.—The T.C. passed plans: Residence, Wickham-avenue, Mr. J. E. Maynard, for J. & T. Skinner; residence, South-cliff, Mr. J. E. Maynard, for — Trowbridge; residence, Brockley-road, Mr. J. E. Maynard, for G. B. Crook; house, Beaconsfield-road, Mr. F. Banks, for J. T. Noble; two bungalows, Coodendrive, Mr. H. W. Parr, for W. C. Greed.

BINGLEY.—The U.D.C. has definitely committed to an expenditure of £27,000 for the provision of new public baths, including a swimming bath, upon a site at Myrtle-grove. Application of sanction to borrow the money is being made to the M.H.

BLACKPOOL.—The T.C. has appointed a sub-committee for a town-planning scheme and for selecting a suitable site for the proposed branch reading room at North Shore.—Mr. E. P. Mawson submitted plan of proposed pavilion to be erected on the putting green in the public park, which was approved.—Tenders for alterations to premises in Lytham-street and West-street, for municipal buildings, are being considered.—Application to the M.H. for sanction to a loan of £20,000 for housing has been made.—It is proposed by the Hesketh-road Primitive Methodists to build a new church.

BRADFORD.—Extensions are to be carried out at the Bowling Back-lane Girls' School, comprising an extra class-room at an estimated cost of £646, for the E.C. Sanction has been received by the Corporation from the M.H. for the carrying out of a scheme at the destructor works in Hammerton-street. All outer walls are to be of concrete instead of brick and stone as at present. The cost will be £1,300.

BRIDGE.—The R.D.C. approved plans: Pair of houses, Littlebourne, for Mr. H. E. Grainger; house, Littlebourne, for Mr. T. Huggett; bungalow, New House-road, Thannington, for Mr. P. A. Tolputt; bungalow, Bond-lane, Barham, for Mr. J. F. Ross; bungalow, Bekesbourne, for Mr. F. G. Mitchell; bungalow, Cherry Gardens-road, Harbledown, for Mr. S. File.

BRIDGEND.—The Bridgend and Cowbridge B.G. is to erect a new receiving home.

BRIGHTLINGSEA.—The U.D.C. received sanction from the M.H. for a loan of £300, subsidies upon four new houses to be erected.

BRISTOL.—One hundred and twenty-six acres of land is to be bought at Almondsbury as a colony for mental cases.

CARNARVON.—The T.C. approved plans for the proposed alterations at Pool Side, Carnarvon, for Messrs. S. Aston & Sons, Ltd.

CHELMSFORD.—Messrs. Golding & Hadler have contemplated building 42 houses in Bishops-road, and have applied to borrow money. Each house will cost £576.

CHESTER.—Mr. P. H. Lawson, City Architect, has been instructed to invite tenders to execute the structural alterations and decorations to electricity showrooms.—Plans prepared by the City Surveyor for the proposed alterations to the Queen-street slaughter-house have been forwarded to the M.H. for approval.—The Town Clerk reported his interview with an official of the M.H. with reference to the erection of additional houses upon the Heath-lane site.—The T.C. are to make application to the M.H. for sanction to borrow an additional sum of £10,000 for housing.—The sanction of the M.H. to the borrowing of £235 for the purchase of the cottages, Nos. 53 and 55, Linenhall-street, has been received.—Plans passed: House, for Mr. W. R. W. Shuard; four houses, for Miss Sheriff Roberts; two houses, Mr. H. Sheriff Roberts; house, for Mr. C. H. Ward; bungalow, for Miss M. Jamieson, all on the Curzon Park estate.—Application is to be made to the Housing Committee to let a small piece of land on the Curzon Park estate for the erection of an open-air sub-station.—A suggestion is now being discussed to provide an institution for 400 mental defectants.

CHESTERFIELD.—Mr. Colin Richardson, of Derby, has bought the malthouses, upon which is to be erected a modern dance hall. The cost of the scheme will be about £10,000.

CLEETHORPES.—The Lindsey C.C. decided to grant £35,450 for the erection of a secondary school.

CLIFTON, NEAR MANCHESTER.—The Clifton & Kersley Coal Co., Ltd., propose to erect a further 50 houses at their Askern Green Colliery Garden Villages. Plans have been prepared by Mr. W. Beech, the company surveyor.

COULSDON AND PURLEY.—Plans passed by U.D.C.: Bungalow, Farleigh-road, for Mr. G. H. Smith; house, Addington-road, for Mr. A. Dunster; eight houses, Selcroft-road, for Mr. F. Brown; house, Ridgway, for Mr. J. Hamilton; new street, off Grovelands-road, for British Land Co., Ltd.; house, Peaks Hill, for Mrs. Browning; house, Downs-road, for Mr. Murray; house, Chipstead Valley-road, for Mr. F. W. Allen; house, Verulam-avenue, for Woodcote Estate, Ltd.; seven houses, Purley Hill, for Mr. J. P. Oldaker; new street, off Marlpit-lane, for Messrs. Hall & Co., Ltd.; house, Victoria-avenue, for Mr. A. F. Crutchfield; house, Kendal-avenue, for Mr. R. Casswell.

CROYDON.—An improvement scheme is now being proposed to improve the aerodrome, at a cost of about £250,000.

DUNDEE.—Plans and sections of proposed new buildings, &c., have been lodged at the office of the City Engineer: Blackness-road, cottages, for J. Cree (architects, Johnston & Baxter); Cambridge-street, cottage, for W. M. Dick (architect, Vernon Constable).

EAST HAM.—The B.C. has approved plans: Hall, club and institute, Katherine-road, for Newman & Jacques; two houses, Whitta-road, for Clemens Bros.; 22 houses, Sandford-road, for Herepath Bros.; five houses, South Esk-road, for J. Walker; bungalow, corner of Wellington-road, and Nelson-street, for W. Newman; 10 houses, Clements-road, for W. Robinson; 23 houses, Holland-road, for W. Robinson; amended design for 55 houses, Eustace-road, for Leyton Building Co.; shop, No. 393, Barking-road, for W. T. & E. Yates.

EDINBURGH.—Plans passed by the Dean of Guild Court: J. Dalton, house, Milton-road, Portobello; H. Hendrie, house, corner of Bonaly-road and Grant-avenue, Colinton; A. Matthew, double bungalow, Corstorphine-bank, St. John's-road, Corstorphine; W. Snowdon and another, two bungalows, Granton-road; Mrs. M. Falconer Cunningham or Hemming, bungalow, Queensferry-road, Blackhall; Mrs. F. Laing, house, Frockstone-brae, Fairmilehead; A. Matthew, two double bungalows, Cluny-gardens.

ESSEX.—A large town-planning scheme is now being discussed by the South Essex Regional Town-Planning Committee. The scheme involves the whole of the south of Essex.

FELIXSTOWE.—The U.D.C. has signed the contract for the purchase of Cliff House, at a cost of £900.

GLASGOW.—Plans passed by the Dean of Guild Court: G. & J. Weir, Ltd., Holm Foundry, Cathcart, house, Barfillan-drive, Cardonald; J. Hunter, sports pavilion off Lennox-avenue, Scotstoun; Andrew Aitken, junr., double villa, Langlands-road, Newlands; W. Campsie, house, 29, Second-avenue, Dumbreck; Corporation Health Department, clinic, Avenuepark-street; Mrs. J. Catherine Macrae, villa, Langlands-road, Newlands; Corporation Housing Department, to erect houses and form streets at Langlands.

GLAMORGAN.—The C.C. is to proceed with the erection of four new schools; at Clydach (for 400 children), at Beddau (300), at Cwmlai (100), and at Llantwit Fardre (350).

GRAVESEND.—Plans passed: Six houses, Sun-lane, for Mr. W. Barton; six houses, Parrock-road, for Messrs. Hopkins & Sons.

GREENOCK.—The Housing Committee recommended that plans should be submitted to the Board of Health for the erection of 54 houses at Cowdenknowe. It was also recommended that a further instalment of 250 houses to replace houses in insanitary areas should be erected on ground to the east of Sinclair-street.

HORNSEY.—The T.C. passed plans: Eight houses, Creighton-avenue, by Mr. A. E. Bailey; house, Priory-gardens, by Messrs. Trant, Brown & Brightiff; house, Sheldon-avenue, by Mr. W. Quennell; factory, Woodside cottages, Churchyard-bottom, by Mr. E. Aumonier; eight garages at the rear of Nos. 34-50, Bedston-road, by Mr. A. E. Butt.

HOYLAND NETHER.—Mr. J. T. W. Savage, of the U.D.C., expressed the hope that at the next meeting the Council would consider the tenders for the erection of houses at Elsecar. There was a strong feeling amongst the Committee that another site should also be selected. A plan of a shop in the High-street for Messrs. Storey & Cooper has been approved.

ILFORD.—The U.D.C. approved plans: Suburban Development (London), Ltd., proposed 12 houses, Perth-road; J. Holley, two houses, St. John's-road; F. B. Harrison, amended plan of 14 houses, Colombo-road; E. Meredith, six houses, Broomhill-road; A. Smith & Son, four houses, Woodstock-gardens; E. Meredith, shop and dwelling, Green-lane; E. Meredith, house, 27, Seven Kings-road; C. J. Dawson, Son & Allardyce, rebuilding of 197–203, High-road; W. Butcher, lock-up garages rear of Nos. 1 to 13, Hatch-lane; H. G. Needham, house, 110, Wards road East; G. E. Withers, Wesleyan Church hall Bennetts Castle-lane; J. W. Davies, 40 houses, Henley-road.

ILKESTON.—The T.C. has passed plans prepared by the B.S. for the provision of eight slipper baths at a cost of £343.

IPSWICH.—The E.C. decided the extension of the School of Arts and Crafts, to provide for 250 students. Mr. E. T. Johns has been appointed architect. The E.C. are to proceed with the completion of the infants' school buildings, Nation-road, which is estimated to cost £3,450. The T.C. is to apply to the M.H. for sanction to the necessary loan. A caretaker's house is to be built between the boys' and girls' departments of the school at an estimated cost of £708.

IRELAND.—A meeting was held by the County Antrim and County Derry ratepayers for the purpose of having a new bridge erected across the Bann river.

LANCASTER.—The T.C. passed plans: Two semi-detached houses in Wingate-Saul-road, for Messrs. Townson & Ward.

LEEDS.—The T.C. accepted, subject to the approval of the M.H., tenders for the erection of 500 houses at the Meanwood, Crossgates, and the Middleton housing estates.

LEEK.—The U.D.C. are now discussing a town-planning scheme. The Housing Committee has offered £850 to the Vicar of All Saints' Church for land in Junction-road for housing purposes, subject to the M.H. approval.

LINTHWAITE.—The D.C. approved plans: Four houses, Causewayside, for Messrs. J. Wimpenny & Co.; house and shop, Cowiersley, for Mrs. Livesey; boiler-house, for the Colne Vale Dye and Chemical Co.

LLANDUDNO.—The U.D.C. passed plans: Building at rear of Lloyds Bank, Mostyn-avenue, for Lloyds Bank, Ltd.; two houses, Lloyd-street West, for Mr. D. Davies; 14 houses, North-retreat, The Oval, off St. George's-road, for Mr. T. R. Hughes and others.—The M.H. forwarded formal sanction to the borrowing of £1,950 for the purchase of sites for the erection of houses in Trinity-street, Mowbray-road, and Knowles-road.—The Surveyor submitted plans of working-class houses proposed to be erected on the sites and on the available portion of the brickfield site, the number of houses proposed on each site being as follows: Knowles-road site, four; Mowbray-road site, 19; Trinity-street site, six; brickfield site, 12.

LONDON (BERMONDSEY).—Plans passed by the B.C.: E. Mortimer (London), Ltd., 12 lock-up shops with flats over, 66-72, Tower Bridge-road, North, Robin & Wilsdon, architects.

LONDON (CAMBERWELL).—The B.C. has made application to the L.C.C. for sanction to the necessary loan for road works, which is estimated at £27,363.

LONDON (ISLINGTON).—The L.C.C. are to erect a school in Twyford-street, N.1.

LONDON (LEWISHAM).—Plans passed by the B.C. Eaglen Bros., 16 houses, Burnt Ash-hill and Baring-road; Chas. Engram & Co., 19 houses, Como-road; W. J. Scudamore, Ltd., five houses, Manor-lane; J. G. Stephenson, elementary school for L.C.C. on Downham Estate; The British Economy Association, Ltd., house, Canonbie-road; C. Cutler & Sons, house, Fairfield-road; A. J. Glock, 22 houses, Ewhurst-road; F. Clode, six houses, Kemble-road; H. R. Watt, nine houses, Bellingham-road; W. Quilter, house, Marvels-lane; Eaglen Bros., bungalow, Baring-road; H. R. Watt, four houses, Thornsbeach-road. Proposals have been made to the B.C. as to the desirability of constructing a subway under the Brighton line of the Southern Railway in lieu of the present footbridge connecting Sydenham Park with Mayow-road, for which the Borough Surveyor has submitted plans. The scheme is estimated to cost £8,000.

LONDON (MUSWELL HILL).—A new school is to be erected by the Hornsey E.C. to provide for about 1,000 children.

LONDON (PECKHAM).—The L.C.C. agreed to an expenditure of £3,250, recommended by the E.C., for the purchase of a new site for Secondary School for Girls. The site is in Homestead-road.

(*Continued on p. 95.*)

* See also our List of Contracts, Competitions, etc.

PRICES CURRENT OF MATERIALS

[Owing to the exceptional circumstances which prevail at the present time, prices of materials should be confirmed by inquiry.—Ed.]

BRICKS, &c.

Per 1,000 Alongside, in River Thames up to London Bridge.

	£ s. d.
Best Stocks	4 3 0
Second Hard Stocks	3 18 6

Per 1,000. Delivered at London Goods Stations.

	£ s. d.
Flettons, at King's Cross	2 13 3
Do. grooved for plaster	2 15 3
Do. Bullnose	3 8 3

Best Stourbridge Fire brick:—

2½ in.	8 11 0	3 in.	10 3 0

GLAZED BRICKS—

Best White Ivory, and Salt Glazed Stretchers	23 0 0	D'ble Str'tch'rs	31 10 0
Headers	22 10 0	D'ble Headers One Side and two Ends	28 10 0
Quoins. Bullnose and 4½in. Flats	29 10 0	Two Sides and one End	32 10 0
		Splays and Squints	33 10 0

Second Quality, £1 per 1,000 less than best. Cream and buff, £2 extra over white. Other colours, Hard Glaze, £5 10s. extra over white.

BREEZE CONCRETE SLABS.

Delivered London.

	s. d.		s. d.
2 in. per yd. super	2 1	3 in. per yd. super	2 11
2½ in. "	2 6	4 in. "	3 6

	s. d.		
Thames Ballast	10 6	per yard.	delivered 2 miles radius Paddington.
Pit Sand	13 9	" "	
Thames Sand	14 6	" "	
Best Washed Sand	14 6	" "	
¾ in. Shingle for Ferro-Concrete	12 9	" "	
¾in.	14 0	" "	
¾ in. Broken Brick	11 6	" "	
Fan Breeze	7 6	"	

Per ton delivered in London area in full van loads.

Best Portland Cement, British Standard Specification Test £2 18 0 to £3 1/- alongside at Vauxhall in 80-ton lots.	£3	3 6
Ferrocrete per ton extra on above	0	10 0
Super Cement (Water) roof)	4	8 0
Roman Cement	8	15 0
Parian Cement	5	15 0
Keene's Cement, White	5	15 0
" " Pink	5	10 0
Plaster, Coarse, Pink	3	0 0
" " White	3	12 6
" Fine	5	12 0
Sirapite, Coarse	3	9 0
" Finish	3	17 0
Grey Stone Lime	2	11 9
Chalk Lime	2	11 9
Best Ground Blue Lias Lime	2	4 6
Hair	17	0 0
Granite Chippings	1	12 0

NOTE.—Sacks are charged 1s. 9d. each and credited 1s. 6d. if returned in good condition within three months, carr. pd.

Stourbridge Fireclay in s'cks 35s. 0d. per ton at rly. dpt.

STONE.

	s. d.
BATH STONE—delivered in railway trucks at Westbourne Park, Paddington, G.W.R., or South Lambeth, G.W.R., per ft. cube	2 9½
Do. do. delivered in railway trucks at Nine Elms, L. & S.W.R., per ft. cube	2 11½
PORTLAND STONE—	
Brown Whitbed, in random blocks of 20 ft. average, delivered in railway trucks at Nine Elms, L. & S.W.R., South Lambeth Station, G.W.R., and Westbourne Park, Paddington, G.W.R., per ft. cube	4 4
Do. do. delivered on road wagons at above stations, per ft. cube	4 5
White basebed, 3d. per ft. cube extra.	

NOTE.—1d. per ft. cube extra for every cut over 20 ft. *average*, and ½d. beyond 30 ft.

HOPTON-WOOD STONE.

Delivered at any Goods Station, London.

Small random blocks, up to 10 ft. cube. Per ft. cube	7/-
Random blocks from 10 ft. and over "	17/-
Sawn two sides "	27/-
Sawn three or four sides "	32/-

YORK STONE, BLUE—*Robin Hood Quality.*

Delivered at any Goods Station London.

	s. d.
6 in. sawn two sides landings to sizes (under 20 ft. super.) Per Ft. Super	5 6
6 in. rubbed two sides, ditto "	6 0
3 in. sawn two sides slabs (random sizes) "	2 3½
2 in. to 2½ in. sawn one side slabs (random sizes) "	1 6½
1½ in. to 2 in. ditto, ditto "	1 4

HARD YORK—

Delivered at any Goods Station London.

Scappled random blocks Per Ft. Cube	6 3
6 in. sawn two sides landing to sizes (under 40 ft. super.) Per Ft. Super	5 1½
	6 1½
6 in. rubbed two sides ditto "	2 10
4 in. sawn two sides slabs (random sizes) "	2 1½
3 in. ditto. ditto "	2 0
2 in. self-faced random flags. Per Yard Super	9 0

ARTIFICIAL STONE.

Delivered in London Area in full van loads, per ft. cube:—Plain, 6s. 6d.; Moulded, 7s. 9d.; Cills, 8s. 3d.

WOOD.

GOOD BUILDING DEAL.

Inches.	per stan.	Inches.	per stan.
4 × 11	£32 0	3 × 6	£23 0
4 × 9	28 0	3 × 11	28 0
4 × 8	26 0	2 × 11	28 0
4 × 7	25 0	3 × 9	25 0
3 × 8	24 0	2½ × 9	25 0
3 × 7	23 0	3 × 4½	24 0
2½ × 7	22 0	3 × 4	24 0

PLANED BOARDS.

1 × 11	£31 0	1 × 9	£30 0

WOOD (*Continued*).

PLAIN EDGE FLOORING.

Inches.	per sq.	Inches.	per sq.
¾	21/-	1¼	32/6
¾	23/-	1½	37/6
1	25/-		

TONGUED AND GROOVED FLOORING.

Inches.	per sq.	Inches.	per sq.
1	25/-	¾	16/6
1¼	32/6	¾	20/-
1½	37/6	¾	25/-

BATTENS

Inches	s. d.	
¾ × 2	2 6	per 100 ft.

SAWN LATHS.

Per bundle				0	2 6
Dry Wainscot Oak, per ft. super, as inch	0 2 0	to	0	2	6
¾ in. do.	0 1 6	to	0	2	0
Dry Mahogany—Honduras, Tabasco, African, per ft. super, as inch	0 1 9	to	0	2	6
Cuba Mahogany	0 3 0	to	0	3	6
Teak (Rangoon, Moulmein or Java), per ft. cube	0 14 0	to		—	
American Whitewood planks, per ft. cube	0 12 0	to	0	14	0
Best Scotch Glue, per cwt.	4 10 0	to		—	
Liquid Glue, per cwt.	4 7 0	to	5	10	0

SLATES.

1st quality slates from Bangor or Portmadoc carriage paid in full truck loads to London Rate Station. Per 1,000 of 1,200.

	£ s. d.		£ s. d.
24 by 12	37 12 6	18 by 10	21 2 6
22 by 12	34 0 0	18 by 9	18 12 6
22 by 11	31 5 0	16 by 10	17 12 6
20 by 12	29 15 0	16 by 8	13 15 0
20 by 10	25 12 6		

TILES.

Per 1,000 f.o.r. London.

	£ s. d.
Best machine-made tiles from Broseley or Staffordshire district	5 12 6
Ditto hand made ditto	5 17 6
Ornamental ditto	6 2 6
Hip and valley tiles (per dozen) { Hand made	0 9 6
Machine made	0 9 0

METALS.

JOISTS, GIRDERS, &c., TO LONDON STATION PER TON—

	£ s. d.
R. S. Joists, cut and fitted	13 10 0
Plain Compound Girders	15 10 0
" Stanchions	17 10 0
In Roof Work	20 10 0

MILD STEEL ROUNDS.

To London Station, per ton.

Diameter.	£ s. d.	Diameter.	£ s. d.
¼ in.	16 10 0	⅜ in. to ½ in.	13 10 0
⅜ in.	14 10 0	⅝ in. to 2½ in.	13 0 0

WROUGHT-IRON TUBES AND FITTINGS—

(Discount off List for lot of not less than £7 net value delivered direct from Works, 2½ per cent. less above gross discounts, carriage forward if sent from London Stocks.)

	Tubes. All sizes.	Fittings. ½"&up.	Fittings. ¼"to¾" inclusive.	Flanges ½"&up.	Flanges ¼"to¾" inclusive.
Black Gas	50 %	50 %	47½ %	60 %	57½ %
Blue Water	45 %	45 %	42½ %	55 %	52½ %
Red Steam	40 %	40 %	37½ %	50 %	47½ %
Galv'd Gas	35 %	40 %	37½ %	50 %	47½ %
" Water.	28½ %	35 %	32½ %	45 %	42½ %
" Steam	22½ %	30 %	27½ %	40 %	37½ %

C.I. HALF-ROUND GUTTERS—London Prices, ex Works.

Per yd. in 6 ft. lengths.	Gutters.	Angles and Nozzles.	Stop Ends.
3 in.	1/1½	11d.	3½d.
3½ in.	1/2½	1/0½	3½d.
4 in.	1/4	1/1½	3½d.
4½ in.	1/5½	1/4	4d.
5 in.	1/7½	1/5½	5d.

O.G. GUTTERS.

3 in.	1/6½	1/2½	3½d.
3½ in.	1/6½	1/2½	3½d.
4 in.	1/7½	1/4	3½d.
4½ in.	1/9½	1/6½	4d.
5 in.	2/1½	1/9	5d.

RAIN-WATER PIPES, &c.

Per yd. in 6 fts.	Pipe.	Bends, stock angles.	Branches, stock angles.
2 in. plain	1/7½	1/1½	1/8
2½ in. "	1/9½	1/4	2/0½
3 in. "	2/1½	1/8	2/5½
3½ in. "	2/6½	1/11½	2/10½
4 in. "	2/11½	2/4½	3/5½

L.C.C. COATED SOIL PIPES—London Prices ex works.

	Pipe. s. d.	Bends, stock angles. s. d.	Branches, stock angles. s. d.
2 in. per yd. in 6fts plain	3 0½	2 2½	2 8
2½ in. "	3 6½	2 5½	3 3½
3 in. "	4 2½	2 8	4 0½
3½ in. "	4 7	3 3½	4 8½
4 in. "	5 1	3 9½	5 5

L.C.C. COATED DRAIN PIPES—London Prices ex works.

	Pipe. s. d.	Bends, stock angles. s. d.	Branches stock angles. s. d.
3 in. per yd. in 9ft. lengths	4 9	5 8	8 10
4 in. " "	6 3	6 8	11 4
5 in. " "	7 6	11 6	18 2
6 in. " "	8 10	14 4	23 5

IRON—	Per ton in London. £ s. d.		£ s. d.
Common Bars	13 10 0	to	14 10 0
Staffordshire Crown Bars—good merchant quality	14 10 0	—	15 10 0
Staffordshire "Marked Bars"	17 0 0	..	18 0 0
Mild Steel Bars	12 0 0	..	13 0 0

METALS (*Continued*).

	£ s. d.		£ s. d.
Steel Bars, Ferro-Concrete quality, basis price	12 10 0	—	13 10 0
Hoop iron, basis price	16 10 0	—	17 10 0
" Galvanised	31 0 0	..	32 0 0
Soft Steel Sheets, Black—Ordinary sizes to 20 g.	14 10 0	..	15 10 0
" " " 24 g.	15 10 0	..	16 10 0
" " " 26 g.	17 10 0	..	18 10 0
Sheets Flat Best Soft Steel, C.R. & C.A. quality—Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	21 0 0	..	22 10 0
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 22 g. and 24 g.	22 10 0	..	23 10 0
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 26 g.	24 10 0	..	26 10 0
Flat and Galvanised Corrugated Sheets—Ordinary sizes, 6 ft. to 9 ft. to 20 g.	20 10 0	..	21 10 0
Ordinary sizes, 6 ft. to 9 ft. to 22 g. and 24 g.	21 0 0	..	22 0 0
Ordinary sizes, 6 ft. to 9 ft. to 26 g.	23 0 0	..	24 0 0
Sheets Galvanised Flat, Best quality—Best Soft Steel Sheets, 6ft. by 2ft. to 3ft. to 20g. and thicker	23 10 0	..	24 10 0
Best Soft Steel Sheets, 22 g. and 24 g.	24 10 0	..	26 10 0
Best Soft Steel Sheets, 26 g.	26 0 0	..	27 0 0
Cut Nails, 3in. to 6 in. (under 3in. usual trade extras.)	20 10 0	..	22 0 0

METAL WINDOWS—Standard sizes suitable for complete houses, including all fittings, painting two coats, and delivery to job, average price about 1/4 to 1/7 per foot super.

LEAD, &c.

(Delivered in London.)	£ s. d.
LEAD—Sheet. English, 4 lb. and up	54 0 0
Pipe in coils	54 10 0
Soil Pipe	57 10 0
Compo pipe	60 10 0

NOTE—Country delivery, 30s. per ton extra; lots under 3 cwt., 2s. per cwt. extra and over 3cwt. and under 5 cwt., 1s. 6d. per cwt. extra. Cut to sizes, 2s. cwt. extra.

Old lead, ex London area, at Mills per ton	40 10 0	..	—
Do., ex country, carriage forward per ton	41 10 0	..	

COPPER.

		s. d.
Seamless Copper tubes (basis)	per lb.	1 1½
Strong sheet	"	2 3
Thin "	"	2 4
Copper nails	"	2 3
Copper wire	"	2 4

PLUMBERS' BRASS WORK.

Delivered in London.

NEW RIVER PATTERN SCREW DOWN BIB COCKS FOR IRON.

½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.
29/-	45/-	76/-	153/-	246/-	510/- per doz.

NEW RIVER PATTERN SCREW DOWN STOP COCKS AND UNIONS.

½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.
41/6	62/-	92/-	174/-	300/-	588/- per doz.

NEW RIVER PATTERN SCREW DOWN MAIN FERRULES.

½ in.	¾ in.	1 in.
59/6	60/-	116/6 per doz.

CAPS AND SCREWS.

1¼ in.	1½ in.	2 in.	3 in.	3½ in.	4 in.
7/8	10/-	14/-	23/-	30/-	42/- per doz.

DOUBLE NUT BOILER SCREWS.

½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2in.
7/6	11/6	17/-	29/-	36/-	63/- per doz

BRASS SLEEVES.

1¼ in.	2 in.	3 in.	3½ in.	4 in.
10/-	12/-	20/-	24/-	31/- per doz.

NEW RIVER PATTERN CROYDON BALL VALVES, S.P

½ in.	¾ in.	1 in.	1¼ in.	1½ in.
35/-	56/-	98/-	162/-	228/- per doz.

DRAWN LEAD P. & S. TRAPS WITH BRASS CLEANING SCREW.

	1¼ in.	1½ in.	2 in.	3 in.
8 lbs. P. traps	33/-	41/-	56/-	101/- per doz.
8 lbs. S. traps	35/-	45/-	66/-	126/- "

TIN—English Ingots, 2/7 per lb. SOLDER—Plumbers' 1/3, Tinmen's 1/5, Blowpipe 1/6 per lb.

PAINTS, &c.

	£ s. d.
Raw Linseed Oil, in pipes per gallon	0 4 6
" " " in barrels "	0 4 8
" " " in drums "	0 4 11
Boiled " " in barrels "	0 4 11
" " " in drums "	0 5 2
Turpentine in barrels "	0 5 6
" in drums (10 gall.) "	0 5 9
Genuine Ground English White Lead, per ton (In not less than 5 cwt. casks.)	63 5 0

GENUINE WHITE LEAD PAINT—"Father Thames," "Nine Elms," "Park," "Supremus," "St. Paul's," "Spedol" and other best brands (In 14 lb. tins) not less than 5 cwt. lots per ton delivered 85 10 0

Red Lead, Dry (packages extra)	per ton	58	0 0
Best Linseed Oil Putty	per cwt.	0	15
Filocol	per cwt.	0	15 6
Size, XD Quality	per gln	0	3 6

[*Continued on next page.*]

* The information given on this page has been specially compiled for THE BUILDER and is copyright. Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the highest or lowest quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

PRICES CURRENT OF MATERIALS (contd.)

GLASS.

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES.

	Per Ft.		Per Ft.
15 oz. fourths ..	3½d.	32 oz. fourths	8½d.
15 „ thirds	4½d.	32 „ thirds	10½d.
21 „ fourths ..	5d.	Obscured Sheet, 15 oz.	4d.
21 „ thirds	6½d.	„ „ 21 „	5½d.
26 „ fourths ..	6d.	Fluted 15oz. 6½d., 21oz.	9½d.
26 „ thirds	7½d.	En'lled 15oz. 5½d., 21 oz	7½d.

Extra price according to size and substance for squares cut from stock.

ENGLISH ROLLED PLATE IN CRATES OF STOCK SIZES.

	Per Ft.
⅛ Rolled plate	4½d.
¼ Rough rolled	5½d.
⅜ Rough rolled	5½d.
Figured Rolled, Baltic, Oceanic, Arctic, Stippolyte and small and large Flemish white..	6½d.
Ditto, tinted	9d.
Rolled Sheet	6d.
White Rolled Cathedral	5½d.
Tinted do.	7½d.

Cast Plate is same price as rough rolled.

VARNISHES, &c.

		Per gallon. £ s. d.
Oak Varnish	Outside	0 14 0
Fine ditto	ditto	0 16 0
Fine Copal	ditto	0 18 0
Pale Copal	ditto	1 0 0
Pale Copal Carriage	ditto	1 4 0
Best Ditto	ditto	1 12 0
Floor Varnish	Inside	0 18 0
Fine Pale Paper	ditto	0 18 0
Fine Copal Cabinet	ditto	1 2 6
Fine Copal Flatting	ditto	1 0 6
Hard Drying Oak	ditto	0 18 0
Fine Hard Drying Oak	ditto	0 19 0
Fine Copal Varnish	ditto	1 0 0
Pale ditto	ditto	1 2 0
Best ditto	ditto	1 12 0
Best Japan Gold Size		0 10 0
Best Black Japan		0 10 6
Oak and Mahogany Stain (water).....		0 12 0
Brunswick Black.....		0 7 6
Berlin Black		0 14 6
Knotting (patent)		1 5 0
French and Brush Polish		0 17 0
Liquid Dryers in Terebine.....		0 9 0
Cuirass Black Enamel.....		0 7 0

Obituary.

The death took place recently of Mr. John Hughes, builder, Doncaster, at the early age of fifty-seven. A native of Liverpool, where his father was in business as a builder, Mr. Hughes removed to Southport as a young man, and in business on his own account was largely responsible, along with four or five others, for the development of modern Southport. He built a large proportion of the residential property there.

THE SCOTTISH BUILDER

NEW BUILDINGS IN SCOTLAND

Dundee.—HOUSES.—The T.C. has decided to erect 200 concrete houses on the pier and panel system of Messrs. H. Boot & Sons, Ltd. It was agreed that direct labour only should deal with the concrete part of the construction, and the joiner work be left to private enterprise.

Ayrshire.—SANATORIUM.—The Ayrshire Sanatorium Committee have decided to proceed with the erection of a children's ward at the Sanatorium at Glen Afton, New Cumnock. The building has to provide accommodation for 20 children, and will give the sanatorium a total accommodation for 125 patients. The estimated cost is £1,700.—The District Committee have decided to order 10 steel houses from Messrs. G. & J. Weir, Ltd., Cathcart, at a cost of £375, or thereby, each, as an experiment. The Chairman of the Ayr District Committee said that they could get these steel houses immediately.

Forres.—SCHOOL.—At the Dean of Guild Court, plans were submitted for the erection of a new school and relative offices at Forres. The estimated cost is £17,000. The plans were passed.

Motherwell.—HOUSES.—The Dean of Guild Court has passed the following plans: Cottage of six apartments at corner of Nigel-street and Hamilton-road, for Archd. Ferguson, builder, Motherwell, at an estimated cost of £1,150; also double villa in Hamilton-road, consisting of two houses of five apartments each, for Mr. Ferguson, at an estimated cost of £2,400.—Double villa in Hamilton-road, for Mrs. Annie Ferguson, consisting of two houses of four apartments each, at an estimated cost of £1,800; cottage in Glasgow-road, Wishaw, of five apartments, for W. Fairbairn.

Uddingston.—INSTITUTE.—The Lanarkshire Welfare Committee has granted Uddingston the sum of £6,000 to erect an institute and bowling green. A site has been obtained at the junction of Jacks-road and Bellshill-road, on the Lanarkshire tramway route, midway between Uddingston Cross and Tannochside-road.

Aberdeen.—SCHOOL.—At the T.C. meeting a letter was read from the E.C. requesting ground on a Town Council site for the erection of an intermediate school. The Committee expressed their approval and instructed the City Chamberlain to negotiate with the E.C.—GYMNASIUM.—The E.C. have decided to provide a gymnasium at the High School for Girls, at a cost of £2,750.

Dunfermline.—HOUSES.—The Town Council propose to erect at Wilson-street four houses of two apartments, and six of three apartments; in Pittencrieff-street district, four houses of two apartments and 12 of three apartments; and at Milton Green, four houses of two apartments and 10 of three apartments; a total of 12 two-apartment and 28 three-apartment houses in all. This scheme is in connection with the rehousing.

Inverkeithing.—HOUSES.—The Town Council will apply to the Scottish Board of Health for permission to proceed with the erection of 50 houses at the Spittalfield area, where they have already built a considerable number of new houses.

Alloa.—HOUSES.—At the last meeting of the Town Council tenders were submitted for 36 additional houses. These will be submitted to the Board of Health for approval. During the winter a report regarding the steel houses will be submitted to the Council by Baillie Mullan.

Kirkcaldy.—HOUSES.—At a meeting of the Town Council the Burgh Surveyor stated that he had prepared a report and a lay-out plan of the housing site at Overton-road, which has been under consideration for some time. The area of the site is about 21.5 acres, and with the density of 12 houses to the acre it would be possible to erect 252 houses in blocks of four. The Council decided to give building contractors the opportunity of tendering and supplying descriptions of their system, in addition to getting prices for the "Duo-slab" system.

Glasgow.—STREETS.—Mr. J. A. Mactaggart, building contractor, proposes the construction of new streets at King's Park, which estate is being developed. Hillfoot Bridge is to be reconstructed at a cost of £14,890.

BUILDING TRADE WAGES IN SCOTLAND.*

THE following are the present rates of wages in the building trade in the principal towns of Scotland. Every endeavour is made to ensure accuracy, but we cannot be responsible for errors that may occur:—

	Masons.	Bricklayers.	Carpenters, Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Brick-layers' Masons' Labourers.	Plasterers' Labourers.
Aberdeen	1/8	1/8½	1/8	1/8	1/8	1/8	1/7	1/0½	
Airdrie	1/8	1/8	1/8	1/8	1/8	—	1/6½	1/3	
Alexandria	1/8	1/8	1/8	1/8	1/8	1/8	—	1/2½ to 1/3½	
Arbroath	1/7	1/7	1/7	1/7½	1/7	1/7	1/5½	1/1½	
Ayr	1/8	1/8	1/8	1/8	1/8	1/8	1/6½	1/3	
Bathgate	1/8	1/8	1/8	1/8½	1/8	1/8	1/6½	1/2 to 1/3	
Blairgowrie	1/7	1/7	1/7	1/7½	1/5	1/7	1/4	10d. to 1/-	
Bo'ness	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3	
Coatbridge	1/8	1/8	1/8	1/8	1/8	—	1/6½	1/3 to 1/3½	
Dumbarton	1/8	1/8	1/8	1/8	1/8	1/8	1/6½	1/3½	
Dumfries	1/6	—	1/6	1/6	1/6	1/6	1/6	1/3½	
Dundee	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3	
Dunfermline	1/8	1/8	1/8	1/8	1/8	1/8	1/6½	1/3½	
Edinburgh	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½	
Falkirk	1/7½	1/7½	1/7	1/8	1/7	1/7	1/8½	1/2½	
Fort William	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/2	
Galashiels	1/6½	1/5½	1/6½	1/7	1/6	1/6½	1/6	1/2	
Glasgow	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½	
Greenock	1/8	1/8	1/8	1/9	1/8	1/8	1/7	1/0½ to 1/3½	
Hamilton	1/8	1/8	1/8	1/9	1/8	1/8	1/8½	1/3½	
Hawick	1/6	1/6	1/6	1/6–1/6½	1/6	1/6	1/6	1/2	
Helensburgh	1/8	1/8	1/8	1/9	1/8	1/8	1/7	1/3½	
Inverness	1/5	—	1/4½	1/4	1/5	1/5	1/4	1d. to 1/2	
Kilmarnock	1/8	1/8	1/8	1/9	1/8	1/8	1/7	1/3½	
Kirkcaldy	1/8	1/8	1/8	1/8	1/8	1/8	1/6½	1/3½	
Kirkwall	1/5	1/5	1/4	1/5	1/5	1/4	1/4	1/0	
Lanark	1/8	1/8	1/8	1/9	1/8	1/8	1/6	1/- to 1/3	
Leith	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/3½	
Motherwell	1/8	1/8	1/8	1/9	1/8	1/8	1/8½	1/3½	
Perth	1/8	1/8	1/8	1/9	1/8	1/8	1/8½	1/3	
Stirling	1/3	1/8	1/8	1/8	1/8	1/8	1/6½	1/3½	
Stirlingshire (Eastern District)	1/8-1/10	1/8-1/10	1/8	1/9	1/7	1/8	1/8½	1/3½	
Wishaw	1/8	1/8	1/8	1/9	1/8	1/8	1/7	1/3½	

* The information given in this table is copyright. The rates of wages in the various towns in England and Wales are given on page 89

ROBERT GORDON'S COLLEGES

A RECENT report by the Engineering Committee of these Colleges stated that they had had under consideration the question of the provision of buildings and equipment to enable the Governors to establish degree and diploma courses in engineering, in co-operation with Aberdeen University. The cost of providing the necessary buildings, apparatus, and equipment for the engineering department would be approximately £50,000. The Committee resolved to recommend to the Governors that a remit be made to the Chairman's Committee to consider and report as to a complete scheme of buildings for the departments of engineering, chemistry, pharmacy, navigation and art (including architecture and building), and the order in which the buildings would be erected, with power to confer with the committees of the departments named, and with the Engineering Committee of Aberdeen University, and to consult with Mr. R. Leslie Rollo, principal teacher of architecture in the College, as to the necessary plans and estimates of cost.

Steel Houses.

In connection with the experimental houses of various types being built at Govan, the Town Council has agreed that three blocks be built of the building material manufactured by Messrs. Fife-Stone, Ltd.

CURRENT PRICES FOR BUILDING WORK IN LONDON*

EXCAVATOR.

		s.	d.
Digging and throwing or wheeling and filling carts, and carting away to shoot—6 ft. deep	per yard cube	11	6
Add if in clay	" "	1	0
Add for every additional depth of 6 ft.	" "	0	6
Planking and strutting to trenches	per foot super	0	5
Do. to sides of excavation, including shoring	" "	1	0

CONCRETOR.

		s.	d.
Portland cement concrete in foundation 1 to 6 ..	per yard cube	32	0
Add if in underpinning in short lengths	" "	7	0
Add if in floors 6 in. thick	" "	3	3
Add if in beams	" "	3	9
Add if aggregate 1 : 2 : 4	" "	10	0
Add for hoisting not exceeding 10 ft. beyond the first 10 ft.	" "	2	6

BRICKLAYER.

		£	s.	d.
Reduced brickwork in lime mortar and Fletton bricks	per rod	30	0	0
Add if in stocks	"	7	10	0
Add if in Staffordshire blues	"	22	0	0
Add if in Portland cement and sand	"	1	10	0

FACINGS.

		s.	d.
Extra for facing in English or Flemish bond for every 10s. per 1,000 over the price of the common bricks	per ft. super	0	0	1½

POINTING.

		s.	d.
Neat flat struck or weathered joint	" "	0	0	3

ARCHES.

		s.	d.
Extra only to the price of ordinary brickwork :—			
Fair external in half brick rings	" "	0	0	10
Axed in stocks	" "	0	1	9
Rubbed and gauged jointed in putty camber or segmental	" "	0	6	0

SUNDRIES.

		s.	d.
Damp course in double course of slates breaking joint and bedded in Portland cement	" "	0	1	0
Setting ordinary register grates and stoves	each	1	0	0
Setting kitchener, including forming flues, &c., with all necessary fire bricks	"	4	15	0

ASPHALTER.

		s.	d.
Half-inch horizontal damp course	per yard sup.	4	3
Three-quarter-inch vertical damp course	" "	8	6
½ inch on flats in two thicknesses	" "	6	3
Angle fillet	per foot run	0	3
Skirting and fillet 6 in. high	" "	1	2

MASON.

		s.	d.
York stone templates fixed	per foot cube	13	0
York stone sills fixed	" "	22	0
Bath stone and all labour fixed	" "	10	6
Portland stone fixed	" "	20	0

SLATER.

		s.	d.
Welsh 16 in. × 8 in. 3 in. lap, including nails	per square	72	9
Do. 20 in. × 10 in. Do. Do.	"	80	9
Do. 24 in. × 12 in. Do. Do.	"	90	0

CARPENTER AND JOINER.

		s.	d.
Fir framed in plates	per foot cube	5	0
Do. joists	" "	5	6
Do. roofs, floors and partitions	" "	6	0
Do. trusses	" "	8	6

		¾"	1"	1¼"	2"
Deal rough close boarding	per sq.	35/6	40/-	45/-	72/-

		s.	d.
Flat centering for concrete floor, including struts or hangers .. "		50	0
Do. to beams	per ft. sup.	1	0
Centres for arches	"	1	6
Gutter boards and bearers	"	1	0

FLOORING.		¾"	1"	1¼"	1½"
Deal-edges shot	per sq.		44/6	53/-	60/6
Do. tongued and grooved	"		49/-	57/6	65/-
Do. matchings	"	45/-	51/-		
Moulded skirting, including backings and grounds	per ft. sup.	1/6	1/9	2/0	2/6

SASHES AND FRAMES.

		s.	d.
One-and-a-half moulded sashes or casements	per foot super	1	10
Two Do. Do. Do.	" "	2	1
Add for fitting and fixing	" "	0	3
Deal-cased frames with 1 in. inner and outer linings, 1¼ in. pulley stiles tongued to linings, hard wood sills with 2 in. moulded sashes in squares double hung, double hung with pulleys, lines and weights; average size	" "	3	9

DOORS.		1¼"	1¾"	2"
Two-panel square framed	per ft. sup.	2/1	2/4	2/6
Four-panel Do.	"	2/5	2/8	2/11
Two-panel moulded both sides	"	2/8	2/11	3/2
Four-panel Do. Do.	"	2/11	3/2	3/5

CARPENTER AND JOINER—continued.

FRAMES.

		s.	d.
Deal wrot moulded and rebated	per foot cube	14	0

		1"	1¼"	1½"
Plain deal jamb linings framed	per ft. sup.	1/7	1/8	1/11
Deal shelves and bearers	"	1/4	1/6	1/9
Add if cross tongued	"	2d.	2d.	2d.

STAIRCASES.

	1"	1¼"	1½"	2"	2½"
Deal treads and risers in and including rough brackets	2/1	2/4	2/9	—	—
Deal strings wrot on both sides and framed	1/8	2/	2/2	2/8	—

		s.	d.
Housings for steps and risers	each	0	11
Deal balusters, 1 in. × 1¼ in.	per ft. run.	0	9
Mahogany handrail; average 3 in. × 3 in.	" "	6	0
Add if ramped	" "	11	10
Add if wreathed	" "	23	9

FIXING ONLY IRONMONGERY (INCLUDING SCREWS).

6 in. barrel bolts	8½d.	Rim locks	2/-
Sash fasteners	11½d.	Mortice locks	4/6
Casement fasteners	1/5	Patent spring hinges and letting in to floor and	
Casement stays	1/2	making good	19/-
Cupboard locks	1/5		

FOUNDER AND SMITH.

		s.	d.
Rolled steel joists	per cwt.	16	3
Plain compound girders	"	19	0
Do. stanchions	"	21	9
In roof work	"	27	6

RAIN-WATER GOODS.

		3"	4"	5"	6"
Half-round plain rebated joints ..	ft. run	1/6	1/9	2/-	2/6
Ogee Do. Do. ..	"	1/9	2/-	2/6	3/3
Rain-water pipes with ears	"	1/9	2/7		
Extra for shoes and bends	each	4/4	5/11		
Do. stopped ends	"	1/11	2/4½	3/7	4/-
Do. nozzles for inlets	"	2/2	2/7	3/10	4/3

PLUMBER.

		s.	d.
Milled lead and laying in flashings and gutters	per cwt.	68	6
Do. Do. in flats	"	67	6
Extra labour and solder in coated cesspools	each	6	9
Welt joint	per ft. run.	0	6
Soldered seam	" "	1	6
Copper nailing	" "	0	6

		½"	¾"	1"	1½"	2"	4"
Drawn lead waste	per ft. run	1/2	1/9	2/0	3/4	4/0	
Do. service	"	1/8	2/2	2/7	3/10		6/9
Do. soil	"						
Bends in lead pipe	each					3/3	8/2
Soldered stop ends	"	1/2	1/8	2/1	2/10	3/6	
Red lead joints	"	11d.	1/-	1/3	1/11	2/4	4/1
Wiped soldered joints	"	2/10	3/6	4/-	4/11	6/6	9/9
Lead traps and cleaning screws	"				14/7	19/6	
Bib cocks and joints ..	"	6/4	9/7	15/4	41/-		
Stop cocks and joints	"	15/4	17/2	25/8	64/-		

PLASTERER.

		s.	d.
Render, float and set in lime and hair	per yard sup.	2	4
Do. Do. Sirapite	" "	2	7
Do. Do. Keen's	" "	3	7
Add sawn lathing	" "	1	7
Add metal lathing	" "	2	6
Portland cement screed	" "	1	11
Do. plain face	" "	3	3
Mouldings in plaster	per 1 girth	0	1
One-and-a-half granolithic pavings	per yard sup.	5	9

GLAZIER.

		s.	d.
21 oz. sheet plain	per foot sup.	0	8
26 oz. Do.	" "	1	0
Obscured sheet	" "	1	1
⅛ in. rolled plate	" "	0	9
¼ in. rough rolled or cast plate	" "	0	10½
½ in. wired cast plate	" "	1	4

PAINTER.

		s.	d.
Preparing and distempering, 2 coats	per yard sup.	0	9
Knotting and priming	" "	0	7
Plain painting 1 coat	" "	0	9
Do. 2 coats	" "	1	2
Do. 3 coats	" "	1	9
Do. 4 coats	" "	2	4
Graining	" "	2	3
Varnishing twice	" "	1	9
Sizing	" "	0	3
Flatting	" "	0	7
Enamel	" "	1	1
Wax polishing	per foot sup.	0	6
French polishing	"	1	2
Preparing for and hanging paper	per piece	2/- to 4/	

* These prices apply to *new buildings only*. They cover superintendence by foreman and carry a profit of 10% on the prime cost without establishment charges. A percentage of 1½ should be added for Employers' Liability and National Health and Unemployment Acts and from 1s. 6d. per £100 for Fire Insurance. The whole of the information given on this page is copyright.

PROPOSED NEW BUILDINGS

(Continued from p. 91.)

LONDON (WOOLWICH).—Plans passed by the B.C.: J. Sutcliffe, Town Hall, for the B.C., 100 houses on the housing estate, Eltham; J. Sutcliffe, Town Hall, for the B.C., electricity sub-station at the Plumstead Market, Plumstead High-street; E. J. Logan, for L. R. Peters, four shops with flats, Well Hall-road, Eltham; W. E. Wright, six houses, Southend-road, Eltham; S. Browne, three houses, 29 to 33, Glenlea-road, Eltham.—The B.C. has received the L.C.C. sanction to a loan of £52,200, for housing. The B.C. has decided to ask the M.H. whether they are prepared to allow the Council to construct 500 concrete houses on the housing estate at Eltham.

LONGTON (STAFFS.).—Plans passed: Two houses, Trentham-road, for Mr. F. Chambers; house, Star and Garter-road, for Mr. S. T. Barker; four houses, Blurton-road, for Messrs. Prestwood Bros.; two houses, Trentham-road, for Mr. W. Bailey; house, Trentham-road, for Mr. H. Rudman.

LOWESTOFT.—The C.B. has received formal sanction from the M.H. to the borrowing of £1,765 for the erection of four houses on the Beccles-road site, and a further sanction to the borrowing of £1,875 for the purpose of subsidies to be granted by the Council in respect of 25 houses to be erected.

LUTON.—Plans passed by the T.C.: A. Mardle, four houses, Argyle-avenue; C. Jeyes, 20 houses, Cavendish and Denbigh-roads; J. E. D. Wallace, four houses, Selbourne-road; A. Tate, two houses, Lincoln-road; L. Shepheard, two houses, Alexandra-avenue; A. Cole, Ltd., 12 houses, Richmond-hill; Luton Industrial Co-operative Society, Ltd., shops and flats, Park-street; W. D. Dyer, house, Marlborough-road; W. Reeve, four houses, Holland-road; A. Catlin, four houses, Biscot-road; E. G. Bell four houses, Dunstable-road.

MANSFIELD.—The T.C. passed plans: J. H. Shipsides, house, Southwell-road, Rainworth; H. Baggaley, six houses, Sandhurst-avenue; A. Peet, house, Normanton-drive.—A new technical school is to be erected for the Notts E.C.

NEWPORT.—A new bridge is to be erected over the River Usk.

NEWTON ABBOT.—A sum of £15,000 is required to complete the Newton Abbot Hospital and extension scheme. The plans have all been prepared and approved.

NORTHAMPTON.—The C.B. passed plans: Semi-detached house, Lime-avenue, E. Hall; house, Cedar-road, Smith & Jones, Ltd.; house, Forfar-street, G. R. T. Norris; house, Forfar-street, G. T. Norris; house, Kingsthorpe-grove, S. E. Robinson; four semi-detached houses, Beech-avenue, Ralph West; detached house, Woodland-avenue, E. Barrett.—The C.B. has decided to make application to the Public Works Loan Commissioners to borrow £15,681 for housing purposes.

NORTH STAFFORDSHIRE.—The Establishment and Hospital Saturday Governors and other workers of the Infirmary met and reported the work with regard to the extensions of the institute. Two of the contracts were being signed—one for the first section of the Nurses' Home, without equipment, at a cost of £31,000, and the other for Ward Block A, which would include a new X-ray department and a new orthopædic department.

POPLAR.—The B.C. proposes to purchase property in Montague-place, for conversion into 24 flats for displaced tenants.

REDCAR.—The T.C. has instructed the Borough Engineer to prepare plans for a shelter to be erected near the pier.

ROCHDALE.—The T.C. passed plans: Hast & Cocker, four houses, Edenfield-road; L. Fletcher, amended plan of six houses, Viking-street; W. H. Ashworth & Son, six houses, Pullman-street; L. Fletcher, four houses, Edenfield-road.

ROTHERHAM.—The E.C. recommended that the provision of a new school at Thorpe Hesley be deemed a matter of urgency. Temporary accommodation is proposed to be provided for 100 girls in the Doncaster Congregational School.

SCARTHO.—The Grimsby T.C. are to build a tuberculosis hospital, at a cost of £8,350.

SCUNTHORPE.—Further consideration is to be given by the Lindsey C.C. with regard to the erection of a secondary school.

SOUTHEND-ON-SEA.—Plans approved by the T.C.: Bungalow, Westleigh-avenue, E. G. Daunter; house, St. Clement's-drive, W. J. White; bungalow, Central-avenue, E. McCann; two houses, Cheltenham-drive, F. J. Gregory; house, Oakleigh Park-drive, J. C. Hutchings; two houses, Cheltenham-drive, Thorby Bros.; 12 houses, Kensington-road, Ventris & King, Ltd.; house, Trinity-road, J. E. Smith; bungalow, Tankerville-drive, L. Gapes; two houses, Duke of Manchester-drive, G. W. Eves; seven bungalows, Trinity-road, W. G. Smith; seven houses and 32 lock-up garages, South-avenue, C. J. Scott; seven houses, Fairmead-avenue, A. Forsaith; house, Second-avenue, W. J. Smee; three houses, Durham-road, E. E. Taylor; four houses, Tintern-avenue, A. J. Mullord; shop and flat over, Leigh-road, J. Elmer; two houses, Canvey-road, F. C. Higgins; shop and flat over, The Broadway, Thorpe Bay, Mrs. A. E. Herbert; 10 houses and two bungalows, Highfield-grove and Highfield-place, Everitt & Pratt; bungalow, Esplanade gardens, Wheeler & Moulding; bungalow, Victoria-drive, A. H. Baker; four bungalows, Acacia-drive, E. Salmons; two bungalows, Parkanaur-avenue, H. J. Manners; two houses and garage, Fernlea-road, Mrs. K. Farnborough; two houses, Walker-drive, Highlands Estate, R. Walker; bungalow, Cumberland-avenue, Mr. Brand; two bungalows, Tunbridge-road, J. P. Harrison; two houses, Lymington-avenue, Hart & McCrow; two houses, Kensington-road, R. Pratt; house, Westcliff Park-drive, A. L. Lawrence; 14 houses, The Broadway, Thorpe Bay, C. Matthews; two houses, Leighton-avenue, M. Kempen; bungalow, St. Augustine's-avenue, J. W. Beare; six houses, Tickfield Estate, F. G. Harrod; three houses, Beach-avenue, Leigh, Wiltshire & Bass; house and garage, St. John's-road, H. Baker; two pairs of flats, Fairfax-drive, T. J. Dennis; house, St. John's-road, P. Barnes & Sons; two houses and house and shop, Westborough-road, Everitt & Pratt; two houses, York-road, A. G. Wilson; two houses, The Broadway, Thorpe Bay, C. Matthews; two houses, Kensington-road, H. C. French; two houses, Richmond-street, C. Leswell; shop, 143, Fairfax-drive, R. G. Meadows; house, The Ridgeway, A. J. Cross; house, The Ridgeway, A. J. Cross; house, The Ridgeway, A. J. Cross; two bungalows, Canvey-road, Smith Bros.; house, Westbury-road, C. Sprules; two houses, South-avenue, L. J. Simpson; two houses, Canonsleigh-crescent, W. Dawes; two houses, Tankerville-drive, Mrs. Hooper and Mr. Shum; four shops and houses and seven garages, Southchurch-road, E. Wingrave; three houses, Duke of Manchester-drive, G. W. Eves; six houses, Fleetwood-avenue, T. J. Dennis; house, Daines-way, Southend Estates Co.; house, Station-road, Leigh, H. S. Love; house, Chadwick-road, S. & A. Riley; four houses, Bonchurch-avenue, R. & W. Emery; two shops and houses, The Broadway, Thorpe Bay, R. Cameron; house, Marguerite-drive, D. Wayland; bungalow, Lord Roberts-avenue, H. W. Watson; two houses, Daines-way, Thorpe Bay, Southend Estates Co., Ltd.; two houses, Daines-way, Thorpe Bay, Southend Estates Co., Ltd.; two houses, Eastwood-boulevard, A. S. Barley; two houses, Kent View-avenue, A. J. Cross; two houses, Kent View-avenue, A. J. Cross; seven houses, Surbiton-road, Purkiss Bros.; house, Boston-avenue, L. M. Harrison; two houses, Hambro'-gardens, J. T. Horsley; two houses, Armitage-road, A. R. Dunnett.

SOUTHPORT.—The Borough Engineer has indicated that the Corporation has secured the provision of nearly 1,000 additional houses, from Crossens to Ainsdale, for the working-classes.

STAINLAND.—The U.D.C. decided to erect 12 houses on the land acquired. It was estimated that the cost of the undertaking would be as follows: Streets and sewers, £1,287; six houses, £3,240; and six more, £3,480. It was decided that application be made to borrow the money.

SUNDERLAND.—The T.C. approved plans for a new bridge over the Wear between Monkwearmouth and Bishopwearmouth. The new bridge is to take the place of the one at present in use. The bridge is to be 80 ft. wide. It was decided to advertise for tenders.

WANDSWORTH.—Plans submitted to the B.C.: Messrs. W. Willett, Ltd., six houses, Crestway, Dover House estate, Putney; Messrs. Knowles & Bird, four houses, Fishponds-road, Balham; Messrs. Durling & Collins, 19 houses, Fishponds-road, Balham; Mr. C. E. Clarke, two houses, Wimbledon Park-road, Southfield; Messrs. H. Dakin & Co., Ltd., two houses, Chartfield-avenue, Putney; Mr. S. Boothman, house, Ullathorne-road, Streatham; Messrs. Chapple & Utting (1) for erection of 28 houses in Ivyday-grove and 16 houses in Gracedale-gardens, Streatham, (2) for erection of 12 houses in Gracedale-gardens, and 14 houses in Culverhouse-gardens, Streatham; Messrs. Blyth, Ltd., six houses in Viewfield-road, Southfield; Messrs. F. T. Wooding & Sons, house, Abbotsleigh-road, Streatham; Messrs. Gordon, Jackson and Lambert, three houses, Leigham-avenue, Streatham; Mr. T. Cooper, on behalf of the Metropolitan Asylums Board, pavilions at the Tooting Bec Mental Hospital, Church-lane, Tooting; the Royal Arsenal Co-operative Society, Ltd., shops with hall over at Nos. 180–214, Upper Tooting-road, Balham; Messrs. Swan Bros., house, Chartfield-avenue, Putney, at corner of Luttrell-avenue; Messrs. Hayes & Co., house, Hilldown-road, Streatham; Messrs. William Willett, Ltd., house in Longwood-avenue, Dover House estate, Putney; Messrs. W. Willett, Ltd., two houses, Crestway and Dover House-road, Putney; Mr. H. J. Chetwood, pavilion, Lyford-road, abutting upon Wandsworth Common, Springfield.—The B.C. recommend that the drawings submitted by the Southern Railway Co. be approved, and that the L.C.C. be asked to increase the limit of their contribution from £2,563 to £3,000 towards the cost for widening the railway bridge over High-street, Putney.—A convenience is to be erected on Streatham Green, for which the M.H. has sanctioned a loan of £2,400.—The B.C. are inviting tenders for the erection of a further 32 non-parlour type houses on the Southfields estate and 48 on the Furzedown estate, on certain selected sites.—A deputation is to wait upon the L.C.C. and the M.H. for further consideration to the question of obtaining loans for the erection of a public library at Earlsfield and a public swimming bath at Streatham, and the reconstruction and extension of Wandsworth Town Hall.

WILLESDEN.—The U.D.C. passed plans: Two semi-detached houses, Wrottesley-road, Harlesden, for Mr. S. P. Laning and Mr. W. Waller; four houses, Sidmouth-road, Brondesbury Park, for Mr. C. W. B. Simmonds; boiler house to factory, Cumberland-avenue, for Park Royal Engineering Works, Ltd.; house, Uffington-road, for Mrs. F. Moody; bungalow, Dollis Hill-lane, Cricklewood, for Miss G. E. Taylor; 104 lock-up garages and service garage, High-road, Willesden Green, for the Brondesbury Park Garages, c/o Robertsons Motors, Ltd.; transformer chamber, Oaklands-road, Cricklewood, for the Council.

YORK.—Consent has been given to the erection of a factory by Messrs. Joseph Terry & Sons, Ltd., on a town-planned area. The Ministry of Health has sanctioned a contract with Messrs. F. Shepherd & Son for the erection of 300 concrete houses at Tang Hall, for £146,262. A kitchen is to be constructed at the Mental Hospital at a cost of about £300. Plans passed: Two houses, Hull-road, for Mr. Tesseyman; house, Stockton-lane, for Mr. J. Reid; two houses, Garth-terrace, for Mr. J. Ankers; two houses, Terry-street, for Mr. W. West.

FIRE.

BURTON-ON-TRENT.—A fire which occurred in the erecting shops of Messrs. Orton & Sons, Victoria-crescent, caused damage to the extent of £25,000.

TENDERS

Communications for insertion under this heading should be addressed to "The Editor," and must reach him not later than Tuesday evening.

* Denotes *accepted*. † Denotes *provisionally accepted*.
‡ Denotes *recommended for acceptance*.
¶ Denotes *accepted subject to modifications*.

BATLEY.—For extensions and alterations to the Batley and District Hospital, for the Hospital Board. Mr. W. Hanstock, architect, Branch-road, Batley:—

Mason and Joiner—
*Harrison, Spenseley & Sons, High-street, Morley ..... about £12,000

BRADFORD.—For the erection of a new electricity transformer sub-station at Rooley-lane, Bankfoot, for the Electricity Committee of the Corporation:—

Mason and Concretor—
*W. Garrett & Co., Birk Hill, Thackley, near Bradford.

Asphalter—
*Tunstall's Seyssell & Limmer Rock Asphalte Co., Ltd., Leeds.

BRYNMAWR.—For erecting 12 parlour type houses for the U.D.C.:—

*G. Smith £5,401 2 6

CORK.—For rebuilding premises in Patrick-street, for Messrs. Roches Stores, Ltd. Messrs. Chillingworth & Levie, architects,

*Murphy Bros.

DUBLIN.—For erection of temporary dwellings, for the City Commissioners:—

	Type "A."	Type "B."
Messrs. Humphreys	£306 10 0	£298 6 8
H. C. McNally	241 11 3	218 15 0
J. Pemberton & Sons....	208 11 0	204 5 6
P. J. Watchorn.....	207 5 6	198 10 6
W. H. Goulding	200 0 0	175 0 0
*H. & J. Martin & Co....	176 10 0	179 10 0

DUDLEY.—Erection of 60 "A" type houses at Bunn's-lane, for T.C.:—

*Butler Bros., Birmingham £26,660

DUDLEY.—Erection of 24 "A" type houses at White Nobs site, for T.C.:—

*Charles Coulson £10,212

DUDLEY.—Erection of 24 "A" type houses at Watson's Green, for T.C.:—

‡Purshouse & Gregory, of Wednesfield £10,740

FERRYBRIDGE.—For reconstruction of a large power station, for the Yorkshire Electric Power Co., Ltd.:—

*Heenan & Froude, Ltd., Manchester.

GUILDFORD.—Fencing 58 houses at Guildford Park, for T.C.:—

Astolat Fencing Co.	£388 6 0
*Fernden Fencing Co.	386 3 8

GUILDFORD.—For erection of three pairs of non-parlour type houses on the Peaslake site, for the R.D.C.:—

W. H. Brown, Ltd., Leatherhead, Surrey	£4,285
G. Grove, Guildford.....	3,960
Bunning, Fitton, Adams, Godalming, Surrey	3,843
*Wood & Sons, Albury, Surrey	3,450

LONDON.—The following tenders have been accepted for the interior cleaning of schools, for the L.C.C. Education Committee:—

W. J. Dixon & Son—The Alma, Bermondsey, W.	£575 0 0
T. Carr—Baker-street, Mile-end	503 0 0
M. Greenwood & Sons, Ltd.—Barrow Hill-road, St. Marylebone	764 0 0
Turnbull & Son—Columbia-road Bethnal Green, N.E.	798 0 0
F. Prater & Sons—Drayton Park Islington, E.....	155 0 0
Triggs & Co.—Eltringham-street, Wandsworth, C.	786 0 0
G. Butters — Gayhurst-road, Hackney, C.	711 12 9
J. Thompson & Son—Harwood-road, Fulham, E.....	350 0 0
T. Carr—Hatfiel -street, Southwark, N.	441 0 0
R. Woollaston & Co.—Hay Currie, Poplar, S.....	531 0 0
Triggs & Co.—Lyham-road, Brixton	563 0 0
A. Soden—Lyndhurst-grove, Camberwell, N.W.	442 12 0
F. Cousin—Mansfield-road, St. Pancras, N.	655 4 0
D. C. Bowyer—Maze-hill, Greenwich	485 7 0
C. Berger—Milson-road, Hammersmith, S.....	213 8 2
T. Carr—The Neckinger, Bermondsey, W.....	464 10 0
Stevens & Sons—Poole's Park, Islington, N.	593 10 0
Barrett & Power—Pritchard's-road, Bethnal Green, N.E...	753 0 0
W. J. Clemens—Redvers-street, Shoreditch	558 10 0
A. G. Shorter—Ruby-street, Camberwell, N.	436 0
Vigor & Co. (Poplar), Ltd.—Rutland-street, Mile End..	

M. Greenwood & Son, Ltd.—Saunders-road, Hammersmith, N.	£689	0 0
S. Blow, Ltd.—Scrutton-street, Shoreditch	475	10 0
A. Black & Son—The Southwark Park, Rotherhithe	698	0 0
J. Scott Fenn—Townsend-street, Southwark, S.E.	656	17 0
W. Bickerton, Trundley's-road, Deptford	541	15 0
J. H. Sutch & Sons—Vicarage-road, Woolwich, E.	188	0 0
Stevens & Sons—White Lion-street, Finsbury	545	0 0

NORTHAMPTON.—For erection of two police houses in Dychurch-lane, for the C.B. :—

‡Throssell & Co. £996 10

NORTHAMPTON.—For erection of "B3" houses, for the C.B. :—

*Jordan	2 houses	£1,054
*A. G. Godwin	2 houses	1,054
*Throssell & Co.	4 houses	2,108
*R. West	4 houses	2,108
*Cockerill	4 houses	2,108
*Smith & Jones, Ltd.	2 houses	1,054
*D. Gibson	4 houses	2,108
*Underwood & Weston	6 houses	3,162

ROTHERHAM.—For the erection of a sample pair of cast-iron houses at Meadowbank-road, for the Housing Committee of the Corporation :—

*J. A. Potter ..... £840 per pair

SONNING.—For erection of two small country houses on the Sonning Links Estate, Sonning, Berks. Messrs. Sheppard & Harris, architects and surveyors, 39, Bloomsbury-square, W.C.1 :—

	Plan A.	Plan B.
Eastlakes, Ltd., Westminster	£2,388	£1,650
Cox & Sons, Maidenhead	2,229	1,800
Collier & Catley, Reading	1,966	1,481
*Russell & Paddick, Sonning	1,885	1,470

THURLES (IRELAND).—For erection of a cottage at Killough, for the R.D.C. :—

*J. Maher £317

THURLES (IRELAND).—For erection of a cottage at Ballycurrane, for the R.D.C. :—

*M. Lambe £291

WAKEFIELD.—For erection of a new Welfare Canteen at Messrs. Patons & Baldwins, Ltd., Thornes Mill. Messrs. Newbald & Hartley, architects, Wakefield :—

Main Contractors—
Wilson, Lovatt & Co., Ltd., Clarence Works, Wolverhampton.

Asphalter's Work—
Thos. Faldo & Co., Ltd., London.

WANDSWORTH.—Conversion of apartments at Council House into offices, for B.C. :—

*Messrs. Somerford & Son £257

YORK.—Painting at the Fever Hospital, for T.C. :—

*T. Vasey & Co. £212 9 6

YORK.—Construction of sewers at Tavy Hall housing estate, for T.C. :—

‡Squires & Sons, Selby £9,022 4

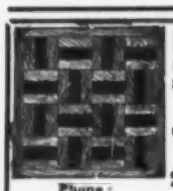
DIARIES AND CALENDARS.

We have received from Messrs. Braithwaite & Co., Ltd., engineers, 117, Victoria-street, S.W. 1, a waistcoat pocket diary for 1925. It contains, apart from the usual contents of a diary, tables, &c., which must be of the greatest value to engineers; and, we may say, the illustrations depicting the work of Messrs. Braithwaite are of very real interest.

The diary which we have received from Messrs. Metchim & Son, surveyors' lithographers, printers, &c., 8, Princes-street, Westminster, S.W. 1, has been revised and re-written by a Fellow of the Surveyors' Institution, and must be of the greatest value to all members of this profession.

From Messrs. Ruston & Hornsby, Ltd., we have received a clearly printed monthly tear-off calendar.

Messrs. William Brown & Co., Ltd., of 2, Bury-court, St. Mary Axe, E.C. 3, and 227-239, Tooley-street, S.E. 1, successors to Sprague Haycock, Ltd., have sent us a calendar, which is an excellent example of the art of reproduction. Mr. Pike has rendered in pencil a picture of "The Old Curiosity Shop." The artist has, in this case, introduced two colours, white and red. The drawing having been made on a buff ruled paper, the use of white chalks added considerably colour interest to the sketch.



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